SOUTHWEST FISHERIES CENTER ADMINISTRATIVE

REPORTS, 1984

No. H-84-7C to H-84-9

H-84-7c

SOUTHWEST FISHERIES CENTER
HONOLULU LABORATORY
NATIONAL MARINE FISHERIES SERVICE
P.O. BOX 3830
HONOLULU, HI 96812

April 1984

LIBRARY
1984
National Marine Fisheries Service
2570 Dole Street
Honolulu, Hawaii

A SUMMARY OF THE STUDY

A COST EARNINGS STUDY OF THE LONGLINE AND HANDLINE FISHING FLEETS IN HAWAII

HAWAII OPINION, INC.
1154 Fort Street Mall, Suite 417
Honolulu, Hawaii 96813

Not for Publication

ADMINISTRATIVE REPORT H-84-7C

A SUMMARY OF THE SURVEY

A COST EARNINGS STUDY OF THE LONGLINE AND HANDLINE FISHING FLEETS IN HAWAII

Contract Number: 81-ABC-00267

Prepared for:

National Marine Fisheries Service

Prepared by:

Hawaii Opinion, Inc.
March, 1984

PREFACE

This report was prepared under contract (81-ABC-00267) by Hawaii Opinion, Inc. of Honolulu, Hawaii. The purpose of the project was to compile current financial and operating information on Hawaii's longline and handline fleets. This report presents the results from the field survey of these fleets. Another report will present an economic analysis of fleet operations.

The longline fleet has been frequently studied in Hawaii. This report presents new and updated information on the subject but the results cannot be considered comprehensive. Hawaii's longline fleet is undergoing significant changes, including a number of new operators, new types of vessels, and new operating patterns. This report concentrates on the more traditional sampan style of longline fishing.

On the other hand, the handline fleets in Hawaii have seldom been studied. This report marks a major advance in knowledge about deep-sea handline fishing for bottom fish and large tunas. One hundred vessel owners, representing a wide cross section of the fleets, were interviewed. The study emphasized vessels which operate in the main Hawaiian Islands, as compared with those which operate in the Northwestern Hawaiian Islands. As such, the report concentrates on a mode of fishing which has become increasingly attractive and accessible to local commercial and part-time fishers.

Collecting cost and revenue information from a wide spectrum of vessel classes is a difficult process. Hawaii Opinion, Inc. took appropriate precautions to insure unbiased and reliable results in their survey. However, readers should utilize the results with care. As usual, the statements, findings, conclusions, and recommendations represented by this report are those of the contractor and do not necessarily represent the views of the National Marine Fisheries Service.

Samuel G. Pooley
Industry Economist

CONTENTS

		Page No.
I.	INTRODUCTION	1
II.	DETAILED WORK PROGRAM	3
III.	LONGLINE SURVEY	6
IV.	SELECTED TABLES: LONGLINE SURVEY	12
	vessel information	13/28
	trip information	29/31
	crew and wages	32/33
	catch	34
	expenses	35/42
	demographic information	43/46
V.	OPENENDED RESPONSES: LONGLINE SURVEY	47
VI.	HANDLINE SURVEY	53
VII.	SELECTED TABLES: HANDLINE SURVEY	57
	vessel information	58/76
	trip information	77/82
	crew and wages	83/85
	catch and revenue	86/95
	expenses	96/101
	demographic information	102/107
VIII.	OPENENDED RESPONSES: HANDLINE RESPONSES	108
APPENDICES		113

A. NMFS cover letter, longline and handline

B. Mailout questionnaire

C. Longline survey instrument

D. Handline survey instrument

I. INTRODUCTION

Since the early 1970's there has been an increasing interest in the the state's fisheries, and various government agencies have taken an active role in promoting their growth and development. Hawaii Opinion, Inc., was contracted by the U. S. Department of Commerce, NOAA, National Marine Fisheries Service (NMFS) for a cost earnings study of the longline and handline fishing fleets in Hawaii, as a means to better understand fiscal and other concerns of these fisheries and to project the financial impacts of various management policies on individual longline and handline fishermen.

The methodology used to collect data for this study was an in-person survey of most longline captains or boat owners on Oahu, and subsequent in-person interviews with 100 handline fishermen throughout the state. The data were used to create prototypes of each fishery in order to test a number of management and development policies as they impact on these fisheries. This report describes the survey component of the research in detail, and includes relevant materials documenting the conduct of the research along with narrative writeups of responses to selected questions. Although similar in many respects, the longline and handline surveys contain sufficient differences that each will be treated separately in this report. The following pages present the detailed work plan which guided the longline and handline surveys from initial preparation through final reporting.

II. DETAILED WORK PROGRAM

RFP Response

- Review RFP to analyze issue and make preliminary assessment of information needs
- Review relevent existing information to corroborate preliminary assessments
- Draw preliminary work plan, sampling frame, questionnaire for proposal
- Consult with client on proposal, adjust as necessary for approval

Project Development

- Finalize questionnaire
- Sample frames (develop vessel inventory)
- Detail preliminary supplemental information needs
- Consult with sub-contractors to assign work items
- Coordinate with client on introductory letter to respondents
- Hire and train interviewers, researchers; develop fielding program
- Pretest questionnaire
- Consult with client and adjust as necessary

Data Gathering

- Print questionnaire
- Mail introductory letter to respondents
- Conduct interviews in sampled fisheries, as vessel inventory is completed (longline first, then full-time handlines)
- 1. longline ahi
  2. handline bottomfish palu ahi
  3. handline tuna night-fishing ika-sibi
  4. part-time handline palu ahi and ika-sibi

Data Gathering (cont.)

- Begin supplemental information gathering:

  a) fuel, bait, ice prices

  b) vessel sale listings

  c) licenses and fees (excise, commercial fishing, boat registration, moorage, unloading, auction)

Processing

- Edit and code interviews (by batch)
- Program interview processing
- Clean program run, process data (by batch)
- Establish results
- Develop unified data base (with questionnaire results and supplemental information)

Reporting

- Develop drafts of historical trends and economic performance as information is collected
- As information gathering is completed and analyzed, prefinalize drafts of historical trends and economic performance
- Consult with client on format, coverage, and consistency
- Submit pre-final report of all three components
- Print and deliver 35 copies of final report

III. LONGLINE SURVEY

The longline tuna fishery is Hawaii's second most important commercial pelagic fishery. In this survey of Oahu longliners, trained Hawaii Opinion interviewers were directed to interview captains and owners of longline vessels. A review of the preparation for and execution of this survey follows.

Sample

The sample for the longline survey was provided by NMFS staff. A total of 38 vessel names and owners represented the universe for the study and was assumed to contain all members of Oahu's longline fleet. This included both "flagline," part-time, and small scale vessels using modified longline gear.

Survey Instrument

The survey instrument (attached) for the longline survey was developed cooperatively by staff members at NMFS and Hawaii Opinion, with NMFS contributing detailed information concerning the fishery and Hawaii Opinion providing direction in format and design. The survey instrument was divided into six major component parts:

- vessel information
- trip data
- crew and wages
- catch and revenue
- costs
- demographics

Tables reporting key variables in each group are appended to this report.

Vessel Information

This section was designed to collect basic descriptive information on the boat itself, as well as ownership arrangements and sources of original financing.

Trip Data. This section describes fishing trip movement during the previous year. Busy and slow months, length of trips and distance to fishing grounds were reported as average figures. Respondents were also asked to describe a typical trip, step by step. Interviewers recorded the answers verbatim, and prompted respondents to cover all of the key items outlined for them in the survey instrument.

Crew and Wages. Typical crew size and wage/percentage-of-catch payment questions were asked.

Catch and Revenue. For six selected species of fish plus any other species for which there was a substantial catch, data were collected on the size of catch, pounds sold and revenue for the past year. Respondents were also asked about where the catch is landed and how it is sold.

Costs. An itemized account of fixed and variable costs to operate the boat and conduct business as a longliner. Included in this section were three openended questions which asked the respondent to describe changes in the nature of the fishery and problems evident in the longline fishery today.

Demographics. Basic demographic information concerning the respondent's income, extent of involvement in longlining, age, sex, and ethnicity.

A complete copy of the survey instrument is included in the appendix to this report.

Data Collection

Two of Hawaii Opinion's staff members, one of them fluent in English and Japanese, conducted the longline interviews. Prior to the fielding, a training session was held to review in-person interviewing techniques, explain each questionnaire item, and present an overview of the longline industry. Data collection was conducted from June 30, 1982, to July 30, 1982. Most interviews were accomplished through direct contact at the piers, since the comings and goings of each vessel are irregular and depend on the success of the catch.

A total of 13 interviews were completed. Additional attempts were made to recontact respondents between December 7, 1982, and December 15, 1982, in those cases where editing revealed incomplete or missing information. Completed interviews were edited, coded, and keypunched onto magnetic tape. This tape was used for the construction of frequency tables as a final check on data quality, before it was used for development of the prototype and associated policy testing. The results of the fielding process are as follows:

38-total number of vessels

13-interviews completed

12-unable to contact during the length of the study

13-vessels based off-island, unable to contact

It is important to note that certain questionnaire items in particular received a poor response from the longline fishermen. Most notable were those questions dealing with fixed and variable costs, and revenues from landed catches. Any respondent might be expected to have some difficulty in recalling a particular answer such as the exact year in which a boat was built; asking respondents to speculate on answers to questions about the current value of their boat and other such speculative items might also prove too difficult for some captains. Still other missing answers have quite logical explanations. For example, asking the cost of the boat engine proved unaswerable when the purchase price of the boat was a single figure which included the engine.

While the above examples explain some instances of missing information, it was the interviews' impression that the longline captains, in general, were reluctant to reveal a detailed, economic profile of their operation. It is impossible to say with certainty when a non-response represents information which has been purposely withheld, but it is clear from past experience in fisheries research that fishermen prefer to be somewhat elusive in their answers, not only in regards to the economics of of their operations, but also the location of fishing grounds and any techniques employed which might give them an edge over the

competition. Since we had to rely on the longline captains' willingness to comply with this study, i.e., their "goodwill," to enable us to conduct the research, a respondent who was unwilling to answer a question could in no way be coerced to do so. The interviewers were skilled in probing, gathering complete answers and establishing a friendly rapport with the fishermen. It is our feeling that the information which could not be collected was largely due to the reluctance of the respondents.

IV. SELECTED TABLES: LONGLINE SURVEY

LONGLINE

LENGTH OF BOAT

Q. What is the length of your boat?

	number
less than 35 feet	--
35 feet to 44 feet	--
45 feet to 54 feet	3
55 feet to 64 feet	5
65 feet to 74 feet	4
75 feet plus	1
total	13

range: 45 feet to 75 feet

mean: 61.2 feet

LONGLINE

TONNAGE

Q. What is the capacity or tonnage of your boat?

	number
less than 1,000 lbs.	1
1,000 to 1,999 lbs.	6
2,000 to 2,999 lbs.	2
3,000 to 3,999 lbs.	--
4,000 to 4,999 lbs.	1
5,000 to 5,999 lbs.	1
6,000 plus lbs.	1
don't know/refuse	1
total	13

range: 700 to 6,500 lbs.

mean: 2,550.0 lbs.

standard deviation: 1,794.7 lbs.

LONGLINE

YEARS OWNED

Q. How many years have you owned your present boat?

	number
less than five years	3
five to nine years	2
10 to 19 years	3
20 to 29 years	4
30 plus years	1
total	13

range: two to 32 years

mean: 14.8 years

LONGLINE

YEAR BUILT

Q. When was the boat built?

	number
prior to 1940	1
1940 to 1949	5
1950 to 1959	2
1960 to 1969	3
1970 to 1979	1
1980 on	1
total	13

range: 1925 to 1980

mean: 1956.5

standard deviation: 14.9 years

LONGLINE

PURCHASE PRICE

Q. What was the cost of the boat when you purchased it?

	number
less than $10,000	2
$10,000 to $29,999	4
$30,000 to $49,999	--
$50,000 to $69,999	--
$70,000 to $89,999	--
$90,000 to $109,999	2
$110,000 to $149,999	--
$150,000 to $199,999	2
$200,000 to $499,999	1
don't know/refuse	2
total	13

range: $5,500 to $443,406

mean: $94,536.9

standard deviation: $129,257.4

LONGLINE

CURRENT VALUE

Q. What would you say is the value of the boat today?

	number
less than $50,000	2
$50,000 to $99,999	4
$100,000 to $199,999	1
$200,000 to $299,999	1
$300,000 to $399,999	2
$400,000 to $499,999	--
$500,000	1
don't know/refuse	2
total	13

range: $29,000 to $500,000

mean: $170,318.2

standard deviation: $155,761.1

LONGLINE

OWNERSHIP

Q. Do you own this boat by yourself, in partnership, by a corporation, or do you have another form of ownership?

	number
sole proprietorship	8
partnership	1
corporation	2
other	2
total	13

METHOD OF FINANCING

Q. How was the boat originally financed?

	number*
personal funds	8
other investors	11
bank loan	6
government guaranteed loan	2
other	1

*mentions sum to more than 13 due to multiple methods of financing

LONGLINE

PERCENT COST FROM PERSONAL FUNDS

Q. What percentage of the total cost of your boat was paid for by personal funds?

	number
none	5
1 to 20 percent	2
21 to 40 percent	3
41 to 60 percent	1
61 to 80 percent	--
81 to 100 percent	2
total	13

range: 12 to 100 percent

mean*: 47 percent

*excludes those who did not use personal funds

LONGLINE

PERCENT COST FROM REGULAR BANK LOAN

Q. What percentage of the total cost of your boat was paid for by a regular loan from a bank?

	number
none	7
zero to 24 percent	--
25 to 49 percent	--
50 to 74 percent	1
75 to 100 percent	5
total	13

range: 67 to 100 percent

mean*: 45 percent

*excludes those without regular loan financing

DOLLARS BORROWED

Q. How much money did you borrow?

	1st loan	2nd loan	3rd loan
no loan	2	9	9
less than $25,000	4	0	0
$25,000 - $49,999	0	0	0
$50,000 - $74,999	2	0	0
$75,000 - $99,999	0	0	0
$100,000 - $249,999	1	0	0
$250,000 - $499,999	1	0	0
don't know/other	3	4	4
	13	13	13

range: $5,500 - $388,000

LONGLINE

ELECTRONIC EQUIPMENT VALUE (ESTIMATED)

Q. What do you think all of the electronic equipment on board your boat is worth?

	number
Less than $5,000	2
$5,000 to $9,999	5
$10,000 to $24,999	2
$25,000 to $49,999	1
don't know/other	3
total	13

range: $2,000 to $30,000

mean: $9,300

LONGLINE

ENGINE HORSEPOWER

Q. What horsepower is your boat's engine?

	number
less than 150 hp.	3
150 to 199 hp.	2
200 to 249 hp.	1
250 to 499 hp.	5
500 plus hp.	2
total	13

range: 115 to 671 hp.

mean: 297 hp.

LONGLINE

ORIGINAL ENGINE COST

Q. How much did the engine cost?

	number
less than $25,000	2
$25,000 to $49,999	2
$50,000 and over	--
don't know/other	9
total	13

range: $4,000 to $35,000

mean: $20,750

LONGLINE

CURRENT ENGINE COST

Q. What do you think the engine value is today?

	number
less than $25,000	6
$25,000 to $49,999	1
$50,000 and over	2
don't know/other	4
total	13

range: $6,000 to $76,000

mean: $28,889

LONGLINE

AVERAGE TRAVELING SPEED

Q. When you're in transit, what is your average speed?

	number
five knots	1
six knots	2
seven knots	3
eight knots	4
nine knots	2
10 knots	1
total	13

mean: 7.5 knots

LONGLINE

ENGINE FUEL CONSUMPTION

Q. What is your engine's fuel consumption--how many gallons per hour do your engines require?

	number
five gallons per hour	3
six to nine gallons per hour	4
10 to 14 gallons per hour	--
15 to 19 gallons per hour	2
don't know/refuse	4
total	13

mean: 8.4 gallons per hour

LONGLINE

REPLACEMENT VALUE OF LINES AND HOOKS

Q. How much would it cost to replace all of the ropes, hooks, swivels, leaders, weights, and floats you have at this time?

	number
less than $10,000	1
$10,000 to $19,999	2
$20,000 to $29,999	4
$30,000 to $39,999	1
$40,000 to $49,999	--
$50,000 to $59,999	1
$60,000 to $69,999	1
$70,000 to $79,999	1
$80,000 to $89,999	--
$90,000 to $99,999	2
total	13

mean: $30,682

LONGLINE

NUMBER OF REELS AND WINCHES, GURDIES AND LINEHAULERS

Q. How many reels and winches, gurdies and linehaulers do you have?

	reel & winches	gurdies & linehaulers
no items	10	0
one item	1	10
seven items	0	1
don't know/refuse	2	2
total	13	13

LONGLINE

BASKETS OF LINE

Q. How many baskets do you have?

	number
less than 25 baskets	3
25 to 49 baskets	1
50 to 74 baskets	5
75 to 99 baskets	1
don't know/refuse	3
total	13

range: 0 to 90 baskets

mean: 43.7 baskets

standard deviation: 27.1 baskets

LONGLINE

MILES OF LINE

Q. How many miles of line do you have?	number
less than 10 miles	1
10 to 19 miles	3
20 to 29 miles	2
don't know/refused	7
total	13

range: 3 to 22 miles

mean: 14.2 miles

standard deviation: 7.7 miles

LONGLINE

AVERAGE TRIPS PER MONTH

Q. For the average month in the last year, could you tell me approximately how many fishing trips you took?

	number
one trip	1
two trips	4
three trips	5
four trips	3
total	13

range: 1-4 trips

mean: 2.8 trips

standard deviation: 0.9 trips

LONGLINE
DURATION OF TRIP

Q. What was the average duration of each of your fishing trips in the last year?

	number
three days	1
four days	1
five days	2
six days	2
seven days	4
eight days	3
total	13

range: 3 to 8 days

mean: 6.2 days

standard deviation: 1.6 days

LONGLINE
NUMBER OF HOOKS USED PER SET

Q. How many hooks do you use on each set?

	number
less than 200 hooks	2
200 to 399 hooks	4
400 to 599 hooks	--
600 to 799 hooks	3
800 to 999 hooks	4
total	13

range: 120 to 660 hooks

mean: 369 hooks

LONGLINE
DISTANCE OF SETS LAID

Q. Now I would like you to think of the distances you traveled last year in your boat to reach various fishing rounds. Please look at the distances listed on this card. First, tell me which of these distances from shore represent fishing grounds that you use. Then I need to kow what percent of your total fishing time for the year was spent in each of the areas you used.

distance to fishing grounds	number of mentions*	percent of total fishing time								
		10	20	30	40	50	60	70	80	90
0 to 3 miles	1	1	-	-	-	-	-	-	-	-
4 to 12 miles	3	-	1	1	-	1	-	-	-	-
13 to 50 miles	12	1	3	1	-	2	2	1	0	2
51 to 100 miles	6	-	3	2	-	1	-	-	-	-
101 to 200 miles	6	-	1	1	1	2	1	-	-	-
200 plus miles	2	-	1	-	-	-	-	1	-	-

*multiple mentions allowed for this item

LONGLINE

NUMBER OF SETS LAID

Q. When you fish ___ to ___ miles out, how many sets do you lay on each trip?

distance to fishing grounds	number of mentions*	number of sets				
		one to three	four to seven	40	60	don't know/ refused
0 to 3 miles	1	-	-	-	-	1
4 to 12 miles	3	1	2	-	-	-
13 to 50 miles	12	4	4	2	-	2
51 to 100 miles	6	1	3	-	1	1
101 to 200 miles	6	3	1	-	1	1
200 plus miles	2	-	-	1	-	1

*multiple mentions allowed for this item

LONGLINE

PEOPLE PER TRIP

Q. What is the average or usual number of people aboard your boat on a fishing trip?

number people	boats reporting
two	1
three	3
four	3
five	4
six	1
seven	1
total	13

mean: 4.3 people

LONGLINE
WHO CAPTAINS BOAT

Q. Do you captain the boat on fishing trips or does someone else?

	number
owner	8
hired captain	5
total	13

LONGLINE
HOW CREW IS PAID

Q. Do you pay your crew only in wages, do you pay them by giving them a percentage of the catch, or do you do both?

	number
wages	0
share of catch	11
share and wages	1
don't know/refuse	1
total	13

LONGLINE
PERCENTAGE OF CATCH TO CREW

Q. When you share the proceeds from the catch as part or all of the wages paid to crew members, what percentage of the total catch is given to the crew members?

	number
30 percent	2
42 percent	1
50 percent	5
60 percent	3
don't know/refuse	2
total	13

LONGLINE

SPECIES CAUGHT

Q. Now we need to get some information about your fish catches for the past year. I would like to ask you about your catches of bigeye, yellowfin, albacore, ono, mahimahi, marlin and any other species of fish which you might have caught in 1981. Did you catch any (NAME) during 1981?

	no. answering yes
bigeye	12
yellowfin	12
albacore	12
ono	12
mahimahi	12
marlin	13
pake	0
onaga	0
ehu	0
barracuda	2
aleu	1
bluefin	2
shark	3
moonfish	3
blackdisk	1
seabass	0
taape	0
uku	0
opelu	0
akule	0
other	2

LONGLINE

FIXED COSTS

Q. In this set of questions, I would like to ask you about your fishing expenses for 1981?

	frequency*	range	mean	standard deviation
boat mortgage payments	10	0 to $80,000	$16,456	$26,660
other loans for fishing purposes	9	0 to $26,000	$4,556	$8,676
licenses and fees	8	$12 to $12,000	$2,241	$4,191
administrative assistance	7	$75 to $2,500	$1,182	$1,050
total			$24,435	

*excludes "don't know/refused" responses

LONGLINE

VARIABLE COSTS

Q. In this set of questions, I would like to ask you about your fishing expenses for 1981?

	frequency*	range	mean	standard deviation
engine repairs	7	0 to $20,000	$10,928	$ 8,238
hull repairs	8	$800 to $6,500	$4,412	$1,876
electronics repairs	8	0 to $2,000	$919	$894
fishing gear repairs	7	$500 to $10,000	$4,671	$3,223
fuel and oil	9	$650 to $27,360	$11,561	$8,257
fishing gear	7	$1,000 to $26,000	$8,871	$10,068
bait	10	$1,200 to $29,700	$12,798	$9,627
ice	10	$363 to $9,600	$4,692	$2,858
food and beverages	10	$200 to $20,400	$8,320	$5,731
auction, sales, and unloading fees	4	$4,560 to $40,000	$21,390	$16,449
salaries	6	-- --	--	--
commissions	6	-- --	--	--
share of fish	4	$11,300 to $97,500	$57,200	$37,401
total			$145,762	

*excludes "don't know/refused" responses

LONGLINE

REPAIRS

Q. Do you personally do any of your own repairs and maintenance on your boat or fishing equipment? About how many hours would you say you worked on boat related repairs and maintenance in 1981?

A. Yes, 9 of the 13 respondents said they do their own repairs.

	number
less than 100 hours	2
100 to 499 hours	0
500 to 599 hours	2
600 to 699 hours	1
700 to plus hours	1
don't know/other	3
total	9

range: 6 to 756 hours

mean: 417 hours

LONGLINE

WHERE REPAIRS MADE

Q. Where do you normally make your repairs?

	number
at Pier 17	3
at Pier 15	1
at Kewalo	3
at Hawaii Tuna Packers	1
other	5
total	13

LONGLINE

YEARS FISHING COMMERCIALLY

Q. For how many years have you been fishing commercially?

	number
less than 10 years	3
10 to 19 years	2
20 to 29 years	3
30 to 39 years	3
40 plus years	2
total	13

range: 1 to 40 years

mean: 21.4 years

LONGLINE

YEARS FISHING LONGLINE

Q. How many years have you been longline fishing?

	number
less than 10 years	6
10 to 19 years	3
20 to 29 years	0
30 to 39 years	3
40 plus years	1
total	13

range: 1 to 40 years

mean: 15.4 years

LONGLINE

YEARS THIS VESSEL

Q. How many years have you been longline fishing with this vessel?

	number
less than 10 years	8
10 to 19 years	1
20 to 29 years	4
30 to 39 years	0
40 plus years	0
total	13

range: 1 to 27 years

mean: 9.9 years

LONGLINE

YEARS PREVIOUS VESSEL

Q. How many years have you been longline fishing with a previous vessel?

	number
less than 10 years	4
10 to 19 years	3
20 to 29 years	0
30 to 39 years	0
40 plus years	0
don't know/other	6
total	13

range: 0 to 12 years

mean: 6 years

LONGLINE

PRIMARY OCCUPATION

Q. Do you consider fishing your primary occupation?

A. Yes, 11 of 13 respondents said fishing is their primary occupation.

LONGLINE

HOURS PER WEEK FISHING

Q. How many hours each week would you say you work at fishing, including preparation, actual fishing, selling your catch, and so on?

	number
less than 25 hours	3
25 to 49 hours	2
50 to 74 hours	1
75 to 99 hours	4
100 plus hours	1
don't know/other	2
total	13

range: 0 to 100 hours

mean: 54.4 hours

LONGLINE

ANNUAL INCOME

Q. I would like you to look at this card and tell me in which category your annual income from fishing falls into.

	number
under $5,000	1
$5,000 to $10,000	0
$10,001 to $15,000	3
$15,001 to $20,000	1
$20,001 to $25,000	2
$25,001 to $30,000	0
$30,001 to $40,000	0
$40,001 to $50,000	2
over $50,000	3
don't know/refuse	1
total	13

estimated mean: $29,792

LONGLINE

RESIDENCE

Q. Are you a lifetime resident of the State? (IF NO,ASK:) How many years have you lived in Hawaii?

	number
lifetime	7
less than two years	0
two to five years	0
six to 10 years	3
more than 10 years	3
total	13

LONGLINE

ETHNICITY

Q. What is your ethnic background?

	number
Caucasian	2
Chinese	0
Filipino	0
Hawaiian/part-Hawaiian	1
Japanese	7
other/mixed	3
total	13

LONGLINE

GENDER

All 13 respondents to the longline survey were male.

LONGLINE

AGE

Q. Is your age ...

	number
under 25 years	0
25 to 34 years	1
35 to 44 years	2
45 to 54 years	2
55 to 64 years	7
65 years or older	1
total	13

estimated mean: 55.6 years

V. OPENENDED RESPONSES: LONGLINE SURVEY

LONGLINE - CHANGES AND PROBLEMS IN THE LONGLINE FISHERY (Q.50, 51 AND 52)

Respondents in the longline study, a combination of boat captains and owners, were asked to describe the changes they have made and seen take place in that fishery since they began longlining. In addition, they were asked to describe any problems they see today in the longline fishery. Verbatim answers were transcribed by Hawaii Opinion's interviewers. Only those fishermen who said they have been longlining for more than five years were asked these questions.

Certain answers arose repeatedly when the topic of industry changes was discussed. Both on a personal level and industry wide, the need to fish deeper topped the list of items mentioned. Respondents stated that less fish and smaller fish were being caught, and that fishing deeper has been the solution, along with setting more hooks. There has also been an obvious shift from the old days of tending the lines manually to the use of mechanical linehaulers and coilers, although one captain remarked that these automatic pullers reduce the life of the lines.

The other major change in the industry, which was also expressed as a problem, is that there is less new blood entering the work force on the local level. An increase of Korean fishermen in the longline fleet was mentioned as a growing source of new recruits. One respondent felt that more local boys would be attracted to the industry if proper training were available. He suggested that government assistance for training programs similar to those in Korea, Japan and the Philippines would present longlining as a successful career option to youthful candidates. This would offset the trend mentioned by some respondents of bringing in foreign contract fishermen from Korea who fill job openings and go on to operate new boats in the fleet.

Competition and low selling prices for the catch were the major problems these fishermen found in today's longline fishery. Competition from Japanese boats fishing within 200 miles of Oahu was specifically mentioned. The lack of boats supplying the Hawaiian market was also mentioned, thus making the point that the competition is more an international issue, since the respondents feel that local demands are not being met.

Locally, a variety of other problems were cited, without any particular stress on the degree of importance. One respondent speculated that aggregation buoys placed in waters off Hawaii to attract fish may encourage the depletion of "small fry" or hang up longlines. Another fisherman complained of porpoises that eat the longline bait and divers who "wipe out the resource." Yet another complained of naval exercises on fishing grounds.

Finally, one interviewee cited the lack of better state loans, the fuel tax, and a scarcity of berths as elements which hindered the success and growth of longlining in Hawaii. The Harbor Board was also criticized for being unresponsive and ignorant of the fishery's needs and that the Board was too vulnerable to "the well connected."

These, then, are the changes and problems which our sample of 13 longliners mentioned during the interview. To reiterate their major points, increased competition and scarcity of fish are seen as the primary problems, and that laying deeper lines was the change mentioned most often.

LONGLINE - TYPICAL TRIP (Q.27)

Respondents to the longline survey, captains and owners, were asked to describe a typical fishing trip (Q.27). As a guide to the interviewer, the basic components of a trip (e.g., loading, transit to fishing grounds) appeared in outline form on the questionnaire along with items on which the interviewer was required to probe if the respondent did not remember to cover all pertinent points, such as time spent on a task, specific items loaded, and so on.

The following is a composite picture of a typical trip, assembled from interviews with 13 respondents. Many of the items are handled similarly in all cases; where there is wide variation in the responses, the exceptions are noted as such.

Respondents were asked to begin their descriptions by recounting the loading process. Most respondents spoke of loading as part of general preparation, which begins two or three days before the trip. The boat is checked over for repairs; engine, lights, lines, the hold and hauling equipment are checked in order to prevent malfunctions at sea. It's not until the day the captain plans to leave, or the day before, that the actual loading begins. Fuel, ice, and bait are brought on board at this time. Most captains go directly to the suppliers for these items since this avoids waiting for deliveries. Loading fuel, ice and bait takes about 30 minutes for each item, although this time will increase if the suppliers are busy with other boats. Although the concensus was to go directly to suppliers, one respondent waits for ice deliveries and, if they arrive late (after noon in this instance) the order is canceled The order is placed for the following day when, hopefully, the delivery will arrive on time. Several respondents mentioned delays caused by ice being unavailable. Groceries are purchased in advance as part of the preparation, and loaded along with the other supplies.

Depending on the size of the boat, and length of the trip, different quantities of ice and bait are loaded. Reports ranged from 40 to 180 blocks of ice loaded, with 50 blocks as the most often mentioned amount. Total time spent loading all supplies ranged from one and a half hours to a maximum of 12. The most frequently mentioned time was six hours, and variations may be accounted for by the number of hands helping to load the boat and whether supplies are picked up or delivered.

Bait is purchased frozen in winter time and fresh (when available) or frozen during the rest of the year. UFA, Otani, Nakazato and Maeda were the particular suppliers

mentioned, and quantities purchased ranged from 15 to 50 cases of bait per trip. Purchases of frozen bait (sama) or fresh bait are supplemented by fish caught before reaching the fishing grounds or once the lines have been laid. Live bait (akule and opelu) is caught at night, since these fish can be drawn to the boat by their attraction to light. One captain explained that on a a seven day trip, enough bait is purchased to meet his needs completely for the first two days at sea and half of what he will need for the rest of the trip. In one instance, imported bait from Japan is used and stored at U. S. cold storage. Another captain stated that Japanese herring did not work well as bait, and that the frozen akule was not very good either.

Transit time to the fishing grounds is dependent, of course, on the distance traveled and speed. Average speed was reported to be almost eight knots and travel time ranged from three and a half hours to two and a half days. The final destination is chosen by the captain, based on his experience. The crew take turns at the wheel, usually at one and half to two hour intervals, and in their free time tie fishing lines, prepare other gear, pack any fish caught while underway, or simply rest.

At the fishing grounds, if the seas are not too rough, the lines are laid. Starting around 5:00 a.m., the mainline is played out in lengths of approximately 1,000 feet. Usually, there are four branchlines attached to each segment of mainline. The branchlines hang vertically from the mainline which floats horizontally (with varying degrees of sag) and is kept afloat by floatlines. Floatlines are connected at each mainline juncture and run vertically from the submerged mainline to a float on the surface. It is the branchlines which carry the hooks for catching fish. It takes about two hours to bait the branch lines and set the mainline which can total 10 or more miles in length. Branchlines are baited and attached to the mainline as it is dropped. Joining of the mainline segments is marked by the floatlines, which end in floats and marker flags. Lines are left for three to seven hours; in the meantime, the line is patrolled. One captain described his method which consisted of "running up" to the first drop point, killing the engine, and waiting to drift to the end point. Usually one crew member operates a mechanical line hauler to retrieve the mainline, and the branchlines along with any fish that are caught, are gaffed and hauled on board manually by one or two crew members. Hauling in the lines can take between five and 10 hours, which has the crew working well into the evening.

Based on response to our survey, the busiest month of the year for longline fishing is December (average three trips per month) with January and December being almost equally rated as the second busiest months.

During the winter months, lines are laid deeper and are left out longer than in the summer. Since there is no guarantee that a particular site will be productive, three or four days can pass before any catch is taken, in which time the lines may be reset in several locations. One boat reported a highly mechanized operation with three separate machines for taking the main line in and out of storage, line hauling, and coiling the branch lines. This setup facilitates resetting the lines and also keeps the crew size to a minimum.

Those fishermen who described the icing method for keeping the catch explained that once the lines are laid, the previous day's catch is first bled, then packed in ice. One captain spoke of refrigerated brine for holding the fish and refrigerated icebox for packing/storage, but in general, insulated brine tanks and crushed ice in ice boxes are used for holding and packing the fish.

Depending on currents and how far a boat must travel to locate fertile fishing grounds, the length of the return trips to port are usually comparable to the trip out. All boats were met at the pier by auction trucks. Unloading takes between 30 minutes and one and a half hours. A crane is used to unload the packed fish.

All fish are sold at auction with 10 percent of sales going to the auction to cover overhead, fuel, ice, unloading, trucking and auctioning of the fish. With approximately 35 percent of the sale of catch allotted for boat related expenses, the remainder of the proceeds are divided between the captain, owner (if he is not also the captain) and the crew.

The last item covered in this portion of the questionnaire dealt with repairs. In general, minor repairs are handled by the captain and crew, either at sea or in port. Specialized repairs of electronic equipment usually require that a technician come aboard or else the equipment is taken to a shop. Major repairs are handled at drydock on an annual basis, usually during the summer for a period of one to three weeks.

IV. HANDLINE SURVEY

For the purposes of this study, Hawaii's handline fishery was stratified by full and part-timers using 40 hours per week as the dividing point. Full-timers were further divided into bottom fishers and tuna handliners. This survey of handline fishermen was conducted statewide; completed interviews were categorized by part-time, full-time tuna and full-time bottom fishing for analysis purposes, as requested by NMFS.

Sample

Sample was provided by NMFS and was drawn from the state's listing of boat owners licensed for commercial fishing. A total of 644 names and addresses were drawn, using a systematic skip to field 100 successful interviews. It was anticipated that many of these names would appear as duplicates (due to multiple boat ownership and outdated records) and that many owners would not be active handliners, since the commercial license file includes longline, troll, and net fishing gear types as well as handline.

The next step in refining the sample involved sending a short mailout survey (see Appendix) to sampled boat owners. This brief survey instrument asked whether or not the respondent was indeed an active handline fisherman and updated telephone and address information. Included with the survey were an introductory cover letter and stamped return envelope. Those respondents who said they were not handliners were eliminated from the sample.

Survey Instrument

The survey instrument for the handline survey was essentially the same as the longline questionnaire, with only slight modifications due to the differences between the two fisheries in terms of equipment, types of fish caught, and a small number of fishery related questions. A copy of the survey instrument is included in the appendix to this report.

Data Collection

A team of eight interviewers, representing Oahu, Maui, Kauai, and Hawaii were trained at Hawaii Opinion's office on Oahu in preparation for the fielding. Training included an item-by-item review of the survey instrument plus practice sessions to sharpen in-person interview techniques.

Fielding took place between November 15, 1982, and January 18, 1983. Interviews were conducted weekdays and weekends, day or evening, at the convenience of the respondents. Up to four attempts were made to contact respondents in the sample. The following is an account of the data collection effort:

644 total sample

100 interviews completed

202 duplicate owner names

136 not active handliners

28 known handliners, but refused or not available for interview

178 unable to contact

Of the 100 handline interviews completed, the breakdown by island and type of fishing is as follows:

	Oahu		Hawaii		Kauai		Maui	
	#	%	#	%	#	%	#	%
tuna handline	15	62	31	62	9	53	3	33
bottomfish handline	4	17	13	26	4	24	6	67
mixed handlines	5	21	6	12	4	23	0	0
	24	100	50	100	17	100	9	100

It is not possible to create a similar profile of the entire survey sample. Of the original 644 names, there were 206 potential respondents (28 refused or not available, 178 unable to contact) who might have produced completed interviews. One might assume that the same distribution of handline type would have been similar had we been able to gather this information on all qualified respondents.

All completed instruments were edited, coded, and keypunched onto magnetic tape. The data tape was used to generate frequency tables and crosstabulations as a final check on data quality. All data entered was 100 percent keypunch verified.

VII. SELECTED TABLES: HANDLINE SURVEY

HANDLINE

ISLAND BASE

	all handline (#)	tuna* (#)	bottom* (#)	mixed* (#)
Oahu	24	15	4	5
Hawaii	50	31	13	6
Maui	9	3	6	0
Kauai	17	9	4	4
total	100	58	27	15

*All handline fishermen (n=100) responding to this survey were categorized into three subgroups to permit further analysis. Type of fishery was based on respondent's reported catch for the last trip. Those whose catch was predominantly (75% or more) tunas (aku, yellowfin, and bigeye) were classed as tuna handliners; bottomfish handliners primarily caught opakapaka, onaga, ehu, uku, and taape; and those who caught comparable amounts of tuna and bottomfish or other types of fish were placed in the "mixed" category.

HANDLINE

LENGTH OF BOAT

Q: What is the length of your boat?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
16 to 18 feet	8	6	2	0
19 to 21 feet	30	18	8	4
22 to 24 feet	31	18	8	5
25 to 27 feet	17	12	2	3
28 to 30 feet	4	0	2	2
31 to 33 feet	3	0	2	1
34 to 36 feet	4	2	2	0
37 to 39 feet	1	0	1	0
40 feet and over	2	2	0	0
total	100	58	27	15
range:	16'/56'	16'/56'	18'/38'	19'/32'
mean:	23.9'	23.7'	24.2'	24.3'
standard deviation:		7.3'	5.6'	3.8'

HANDLINE

TONNAGE

Q: What is the capacity or tonnage of your boat?

tons	all handline (#)	tuna (#)	bottom (#)	mixed (#)
less than 50	10	6	4	0
50 to 99	12	10	2	0
100 to 149	34	19	8	7
150 to 199	10	5	3	2
200 to 249	16	10	3	3
250 to 499	7	2	2	3
500 to 999	5	3	2	0
1000 or more	4	3	1	0
don't know	2	0	2	0
total	100	58	27	15
range (tons):	25/3000	25/3000	30/2500	100/400
mean (tons):	229.8	231.4	261.2	171.7
standard deviation (tons):		433.6	492.7	90.1

HANDLINE

YEARS OWNED BOAT

Q: How many years have you owned your present boat?

	all handline (#)	tuna* (#)	bottom* (#)	mixed* (#)
one year	20	11	5	4
two years	21	14	4	3
three years	12	8	3	1
four years	7	5	2	0
five years	12	7	4	1
six to nine years	21	10	6	5
10 or more years	6	2	3	1
don't know	1	1	0	0
total	100	58	27	15

range: 1 to 35 years

mean: 4.4 years

HANDLINE

YEAR BUILT

Q: When was the boat built?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
prior to 1940	1	0	1	0
1940 to 1949	2	0	1	1
1950 to 1959	4	3	1	0
1960 to 1969	10	6	3	1
1970 to 1979	69	41	17	11
1980 to date	14	8	4	2
total	100	58	27	15
range (years):	1939/1982	1958/1982	1939/1982	1945/1982
mean (years):	1973.7	1974.3	1972.0	1974.3
standard deviation (years):	--	5.8	10.2	8.8

HANDLINE

PURCHASE PRICE AND CURRENT VALUE

Q: What was the cost of the boat when you purchased (p) it? What would you say is the value (v) of the boat today?

	all handline (#)		tuna (#)		bottom (#)		mixed (#)	
	p	v	p	v	p	v	p	v
less than $1000	4	0	3	0	1	0	0	0
$1000 to $2499	4	6	4	6	0	0	0	0
$2500 to $4999	13	5	7	2	4	2	2	1
$5000 to $7499	15	13	8	8	5	4	2	1
$7500 to $9999	7	4	5	1	2	2	0	1
$10,000 to $12,499	11	13	6	6	3	4	2	3
$12,5000 to $14,999	7	1	3	1	4	0	0	0
$15,000 to $17,499	5	10	2	5	1	3	2	2
$17,500 to $17,999	5	5	2	1	1	1	2	3
$20,000 to $29,999	15	19	7	12	3	5	5	2
$30,000 or more	11	20	8	13	3	5	0	2
don't know/refuse	3	4	3	3	0	1	0	0
total	100	100	58	58	27	27	15	15

	tuna	bottom	mixed
range (p):	$700/200,000	$800/60,000	$4,000/23,000
(v):	$1,000/300,000	$3,000/60,000	$4,000/40,000
mean (p):	$19,710.9	$14,685.2	$14,933.3
(v):	$29;394.5	$18,153.0	$17,166.7
standard deviation (p):	$36,021.3	$13,969.1	$6,997.1
(v):	$52,539.2	$13,982.0	$10,160.6

HANDLINE

OWNERSHIP

Q: Tell me, do you own this boat by yourself? (IF NO:) How is it owned--in partnership, by a corporation, or do you have another form of ownership?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
sole proprietor	92	53	25	14
partnership	4	3	1	0
corporation	3	1	1	1
other	1	1	0	0
total	100	58	27	15

HANDLINE

METHOD OF FINANCING

Q: And how was the boat originally financed?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
personal funds	80	46	24	10
other investors	1	1	0	0
regular bank loan	25	13	5	7
government guaranteed loan	3	2	1	0
other	16	10	4	2
base:	(100)	(58)	(27)	(15)

note: responses to this item included multiple mentions

HANDLINE

PERCENT FROM PERSONAL FUNDS

Q: How was the boat originally financed? (continued)

percent personal funds	all handline (#)	tuna (#)	bottom (#)	mixed (#)
none	20	12	3	5
less than 20 percent	2	2	0	0
20 to 29 percent	11	6	3	2
30 to 39 percent	4	2	1	1
40 to 49 percent	1	1	0	0
50 to 59 percent	6	3	3	0
60 to 69 percent	1	1	0	0
70 to 79 percent	1	0	0	0
80 to 99 percent	0	0	0	0
100 percent	54	31	17	6
total	100	58	27	15

range:* 100 percent

mean:* 12.1 percent

*excludes those without financing from personal funds

HANDLINE

PERCENT FROM BANK LOAN

Q: How was the boat originally financed? (continued)

percent bank loans	all handline (#)	tuna (#)	bottom (#)	mixed (#)
none	75	45	22	8
25 to 49 percent	3	2	0	1
50 to 74 percent	6	2	3	1
75 to 99 percent	4	3	0	1
100 percent	11	5	2	4
don't know/refuse	1	1	0	0
total	100	58	27	15

range:* 25 to 100 percent

mean:* 75.5 percent

*excludes those without bank loans

HANDLINE

LOAN TERM FOR FIRST LOAN

Q: For how many years were those loans (to finance the boat)?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
no loan	56	32	17	7
less than five years	14	6	5	3
five to nine years	20	15	2	3
10 to 15 years	6	2	2	2
don't know/refuse	4	3	1	0
total	100	58	27	15

range:* two to 15 years

mean:* 5.6 years

*excludes those without loans

note: Only one respondent mentioned a second loan to finance his boat (a four year loan of undisclosed amount at 11% interest) and is not represented in this table. No respondents mentioned a third loan.

HANDLINE

RATE OF INTEREST

Q: What were the interest rates (on first loans used to finance the boat)?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
no loan	56	32	17	7
less than eight percent	6	3	2	1
eight to 10 percent	14	7	5	2
11 to 13 percent	11	7	1	3
14 to 16 percent	3	1	0	2
17 percent and over	4	3	1	0
don't know/refuse	6	5	1	0
total	100	58	27	15

range:* 5 to 20 percent

mean:* 10.8 percent

*excludes those without loans

HANDLINE

ELECTRONIC EQUIPMENT VALUE

Q: What do you think all of the electronic equipment on board your boat is worth?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
less than $100	10	6	3	1
$100 to $499	13	12	1	0
$500 to $999	18	10	7	1
$1,000 to $1,499	14	8	4	2
$1,500 to $1,999	6	4	2	0
$2,000 to $2,999	13	6	1	6
$3,000 to $3,999	10	5	4	1
$4,000 to $4,999	11	4	3	4
$5,000 and over	5	3	2	0
total	100	58	27	15

range: 0 to $25,000

mean: $2,061

HANDLINE

BOAT HORSEPOWER

Q: What horsepower is your boat's engine?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
less than 100 hp.	16	8	5	3
100 to 149 hp.	28	17	8	3
150 to 199 hp.	16	9	5	2
200 to 249 hp.	17	7	6	4
250 to 299 hp.	6	4	1	1
300 to 349 hp.	8	6	0	2
350 to 399 hp.	0	0	0	0
400 hp. and over	6	4	2	0
don't know/refuse	3	3	0	0
total	100	58	27	15

range: 40 to 700 hp.

mean: 186 hp.

HANDLINE

ENGINE COST AND VALUE

Q: How much did the engine cost (p) and what do you think its value (v) is today?

	all handline (#)		tuna (#)		bottom (#)		mixed (#)	
	p	v	p	v	p	v	p	v
less than $1,000	3	7	3	5	0	1	0	1
$1,000 to $2,499	8	17	6	9	1	4	1	4
$2,500 to $4,999	20	19	11	10	6	5	3	4
$5,000 to $7,499	20	22	13	14	3	5	4	3
$7,500 to $9,999	8	6	6	3	2	3	0	0
$10,000 and over	7	13	5	9	2	3	0	1
don't know/refuse	34	16	14	8	13	6	7	2
total	100	100	58	58	27	27	15	15

range (p): $350 to $33,000
(v): $250 to $40,000

mean (p): $6,386
(v): $5,896

HANDLINE

AVERAGE SPEED

Q: When you are in transit what is your average speed?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
less than eight knots	11	6	3	2
eight to 10 knots	30	14	12	4
11 to 13 knots	16	11	2	3
14 to 16 knots	10	7	1	2
17 to 19 knots	14	7	4	3
20 to 29 knots*	8	5	2	1
30 knots and over*	6	4	2	0
don't know/refuse	5	4	1	0
total	100	58	27	15

range: 4 to 48 knots

mean: 14 knots

*responses in these categories represent unusually high values for handline speeds and may be the product of respondent error

HANDLINE

FUEL CONSUMPTION

Q: What is your engine's fuel consumption - how many gallons per hour do your engines require?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
less than six gallons per hour	68	39	18	11
six to nine gallons per hour	23	11	8	4
10 to 14 gallons per hour	5	5	0	0
15 to 20 gallons per hour	2	2	0	0
don't know/refuse	2	1	1	0
total	100	58	27	15

range: 1 to 20 gallons per hour

mean: 4.6 gallons per hour

HANDLINE

REPLACEMENT COST OF ROPES, HOOKS, ETC.

Q: How much would it cost to replace all of the ropes, hooks, swivels, leaders, and weights, you have at this time.

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
less than $500	14	10	4	0
$500 to $999	18	10	6	2
$1,000 to $1,499	18	8	4	6
$1,500 to $1,999	10	6	3	1
$2,000 to $3,999	29	18	7	4
$4,000 to $5,999	4	2	2	0
$6,000 and over	7	4	1	2
total	100	58	27	15

range: $100 to $12,500

mean: $2,075

HANDLINE

NUMBER LINEHAULERS

Q: How many linehaulers do you have?

number of linehaulers	all handline (#)	tuna (#)	bottom (#)	mixed (#)
none	28	23	2	3
one	18	11	5	2
two	25	10	9	6
three	16	6	8	2
four	11	7	3	1
five or more	2	1	0	1
total	100	58	27	15
range (number of linehaulers):	0 to 7	1 to 5	0 to 4	0 to 7
mean (number of linehaulers):	1.7	1.4	2.2	2.1
standard deviation (number of linehaulers):		1.5	1.1	1.8

HANDLINE

BUSIEST MONTHS

Q: Which months of the year are your (first and second) busiest months?

	all handline (#)		tuna (#)		bottom (#)		mixed (#)	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
January	2	6	1	4	0	1	1	1
February	4	2	2	1	1	0	1	1
March	2	2	2	1	0	0	0	1
April	6	4	3	2	3	1	0	1
May	12	7	8	5	3	2	1	0
June	23	13	16	9	5	4	2	0
July	5	26	0	18	3	5	2	3
August	4	8	1	2	1	3	2	3
September	4	3	3	2	0	0	1	1
October	5	2	4	2	1	0	0	0
November	5	8	0	4	3	3	2	1
December	15	5	10	0	3	3	2	2
don't know/refuse	13	14	8	8	4	5	1	1
total	100	100	58	58	27	27	15	15

HANDLINE

AVERAGE FISHING TRIPS PER MONTH

Q: For the average month in the last year, could you tell me approximately how many fishing trips you took?

number of trips per month	all handline (#)	tuna (#)	bottom (#)	mixed (#)
one to three	17	9	5	3
four to six	34	18	13	3
seven to nine	6	4	1	1
10 to 12	18	8	4	6
13 to 15	5	2	1	2
16 to 18	4	4	0	0
19 to 21	7	7	0	0
22 or more	6	4	2	0
don't know/refuse	3	2	1	0
total	100	58	27	15
range (trips per month):	1 to 25	1 to 25	1 to 25	2 to 25
mean: (trips per month):	9.0	10.0	7.2	8.4
standard deviation (trips per month):		7.2	6.2	4.7

HANDLINE

DURATION OF TRIPS

Q: What would you say was the average duration of each of your fishing trips in the last year?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
one to eight hours	25	15	8	2
nine to 12 hours	38	23	9	6
13 to 16 hours	12	9	1	2
17 to 24 hours	14	6	6	2
25 to 36 hours	3	0	1	2
48 hours	3	1	1	1
72 hours	2	2	0	0
96 hours	1	0	1	0
216 hours	1	1	0	0
don't know/refuse	1	1	0	0
total	100	58	27	15
range (hours):	4 to 216	4 to 216	4 to 96	4 to 48
mean: (hours):	17.5	17.5	17.4	17.5
standard deviation (hours):		29.7	18.6	11.1

HANDLINE

DISTANCE BOAT TRAILERED

Q: What is the distance you trailer your boat from where it is stored to where it is launched?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
not trailered	28	13	12	3
one to five miles	38	22	7	9
six to 10 miles	13	10	2	1
11 to 15 miles	8	5	2	1
16 to 20 miles	4	2	2	0
21 to 40 miles	5	2	2	1
41 to 60 miles	2	2	0	0
95 miles	1	1	0	0
total	100	58	27	15

range: 1 to 95 miles

mean: 10.2 miles

HANDLINE

PIER BOAT MOORED

Q: At what pier is your boat moored?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
not moored	73	46	15	12
Kauai:				
Port Allen	3	0	2	1
Nawiliwili	1	0	1	0
Oahu:				
Kewalo	2	0	2	0
Ala Wai	1	0	0	1
Haleiwa	1	0	1	0
Waianae	3	3	0	0
Maui:				
Maalaea	1	0	1	0
Hawaii:				
Kawaihae	2	1	1	0
Wailoa	7	3	3	1
Honokaa	1	1	0	0
Napoopoo	3	3	0	0
South Point	2	1	1	0
total	100	58	27	15

HANDLINE

DISTANCE TO FISHING GROUNDS

Q: What percent of your total fishing time for the year was spent in each of the areas you used?

distance from shore	conduct any fishing*			
	no.of fisher-men (#)	range of fishing time spent in area (%)	mean % fishing time spent in area (%)	overall mean (%)
one to three miles	46	5/100	61	28
four to 12 miles	64	5/100	61	39
13 to 25 miles	37	5/100	53	20
26 to 50 miles	18	5/100	35	6
over 50 miles (less than 200 miles)	6	5/100	72	4
over 200 miles	3	20/100	50	2

*multiple responses were received for this questionnaire item

**base = 100 for each distance category

HANDLINE

NUMBER OF PEOPLE PER TRIP

Q: What is the average or usual number of people aboard your boat (including yourself) on a fishing trip?

number of people	all handline (#)	tuna (#)	bottom (#)	mixed (#)
one	26	13	9	4
two	49	29	15	5
three	17	12	0	5
four	6	3	2	1
five	1	1	0	0
don't know/refuse	1	0	1	0
total	100	58	27	15

range: 1 to 5 people

mean: 2.1 people

HANDLINE

HOW CREW PAID

Q: How do you pay your crew? Do you pay them wages, a percentage of the catch or does it vary?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
percent of catch only	62	38	14	10
wages plus percent of catch, but varies	1	1	0	0
income pooled or no crew	37	19	13	5
total	100	58	27	15

HANDLINE

PERCENT OF CATCH TO CREW

Q: How do you pay your crew? What percentage of the catch?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
none	37	19	13	5
one to 19 percent	1	1	0	0
20 to 29 percent	8	6	2	0
30 to 39 percent	18	10	5	3
40 to 49 percent	4	3	0	1
50 to 59 percent	3	2	1	0
60 to 69 percent	3	2	0	1
70 to 79 percent	1	0	1	0
80 to 89 percent	0	0	0	0
don't know/refuse	25	15	5	5
total	100	58	27	15

range:* 14 to 75 percent

mean:* 35.8 percent

*excludes those who do not pay crew

HANDLINE

SPECIES CAUGHT LAST TRIP

Q. Now we need to get some information about the fish catch for your last trip. I would like to ask you about your catch of bigeye, yellowfin, opakapaka, onaga, ono, ehu, and any other species of fish which you might have caught on your last trip.

	number of respondents catching any fish			
	all handline* (#)	tuna* (#)	bottom* (#)	mixed* (#)
opakapaka	38	9	20	9
yellowfin	35	28	3	4
ehu	22	4	11	7
akule	22	16	2	4
onaga	19	3	10	6
ono	19	14	2	3
opelu	18	16	0	2
mahimahi	12	10	2	0
uku	11	4	5	2
taape	10	3	4	3
sea bass	8	3	3	2
marlin	5	3	0	2
albacore	2	2	0	0
bigeye	2	1	0	1
other	39	18	12	9

*column totals reflect multiple species catches

HANDLINE

POUNDS CAUGHT AND SOLD LAST TRIP

Q: How many pounds did you catch?...did you sell?

		number of respondents catching and selling fish							
		all handline*		tuna*		bottom*		mixed*	
		(#)		(#)		(#)		(#)	
	lbs.	caught	sold	caught	sold	caught	sold	caught	sold
bigeye.....	none	--	5	--	4	--	1	--	0
yellowfin....	<100	9	10	7	8	2	2	0	0
	100/199	12	7	9	5	1	0	2	2
	200/500	9	8	8	7	0	0	1	1
	>500	4	4	4	4	0	0	0	0
	dk/refused	1	1	0	0	0	0	1	1
albacore.....	<100	2	2	2	2	0	0	0	0
ono.....	none	--	4	--	4	--	0	--	0
	<100	12	9	10	7	2	2	0	0
	100/300	6	5	4	3	0	0	2	2
	dk/refused	1	1	0	0	0	0	1	1
mahimahi.....	none	--	0	--	3	--	0	--	0
	<100	9	6	8	5	1	1	0	0
	100/300	3	3	2	2	1	1	0	0
marlin.....	none	--	1	--	0	--	0	--	1
	<200	2	1	0	0	0	0	2	1
	200/500	2	2	2	2	0	0	0	0
	>500	1	1	1	1	0	0	0	0
opakpaka.....	none	--	8	--	2	--	5	--	1
	<100	27	21	9	7	13	9	5	5
	100/200	9	7	0	0	6	5	3	2
	dk/refused	2	2	0	0	1	1	1	1
onaga.....	none	--	4	--	1	--	3	--	0
	<50	10	8	3	2	5	3	2	2
	50/150	7	6	0	0	4	3	3	3
	dk/refused	2	2	0	0	1	1	1	1

*column totals reflect multiple species catches

POUNDS CAUGHT AND SOLD LAST TRIP (continued)

		number of respondents catching and selling fish							
		all handline* (#)		tuna* (#)		bottom* (#)		mixed* (#)	
	lbs.	caught	sold	caught	sold	caught	sold	caught	sold
ehu.....	none	--	6	--	2	--	4	--	0
	<50	15	9	3	1	9	5	3	3
	50/100	5	5	1	1	1	1	3	3
	dk/refused	2	2	0	0	1	1	1	1
sea bass.....	none	--	1	--	1	--	0	--	0
	6/100	5	4	3	2	1	1	1	1
	dk/refused	3	3	0	0	2	2	1	1
taape.....	none	--	6	--	3	--	2	--	1
	<100	8	2	3	0	2	1	3	1
	100/500	2	1	0	0	2	1	0	0
uku.....	<100	5	5	2	2	3	3	0	0
	100/300	3	3	0	0	1	1	2	2
	dk/refused	3	3	2	2	1	1	0	0
opelu.....	none	--	4	--	4	--	0	--	0
	<100	10	7	9	6	0	0	1	1
	100/250	6	5	5	4	0	0	1	1
	dk/refused	2	2	2	2	0	0	0	0
akule.....	none	--	4	--	2	--	2	--	0
	<100	17	12	11	9	2	0	4	3
	100/300	3	3	3	3	0	0	0	0
	2000	1	1	1	1	0	0	0	0
	dk/refused	1	2	1	1	0	0	0	1
other.....	none	--	15	--	9	--	3	--	3
	<50	19	7	8	1	5	3	6	3
	50/100	5	4	4	3	0	0	1	1
	101/600	10	8	4	3	5	4	1	1
	>2000	1	1	1	1	0	0	0	0
	dk/refused	4	4	1	1	2	2	1	1

*column totals reflect multiple species catches

HANDLINE

CATCH SALES FOR 1981

Q. What was the total amount you sold this species of fish for in 1981?

	$	number of respondents reporting sales for 1981: all handline (#)	tuna (#)	bottom (#)	mixed (#)
yellowfin.	<1,000	9	5	2	2
	1,000/4,999	17	13	1	3
	5,000/9,999	2	1	0	1
	>10,000	8	7	0	1
	dk/refused	51	29	16	6
ono.....	<500	14	8	4	2
	500/999	3	2	0	1
	1,000/5,000	12	7	0	5
	18,200	1	1	0	0
	dk/refused	53	31	17	5
opakapaka.	<1,000	17	8	5	4
	1,000/4,999	9	2	4	3
	5,000/9,999	0	0	0	0
	10,000/50,000	0	1	1	1
	dk/refused	50	34	11	5
onaga.....	<500	10	5	3	2
	500/999	4	0	2	2
	1,000 and over	7	0	3	4
	dk/refused	52	33	14	5
ehu.....	<500	19	7	6	6
	500/3,000	4	0	2	2
	dk/refused	57	36	15	6

note: sales not reported for sea bass, taape, uku, opelu, akule, albacore, mahimahi and marlin

HANDLINE

WEIGHT OF AVERAGE CATCH

Q: What is the weight of your average catch on a fishing trip? (Asked of respondents with atypical last trips.)

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
last trip typical	49	28	13	8
under 50 pounds	5	2	3	0
50 to 99 pounds	7	4	2	1
100 to 199 pounds	15	10	4	1
200 to 299 pounds	12	7	3	2
300 to 399 pounds	2	0	0	2
400 to 499 pounds	1	1	0	0
500 to 599 pounds	5	3	2	0
600 to 899 pounds	0	0	0	0
900 to 999 pounds	2	1	0	1
don't know/refuse	2	2	0	0
total	51	30	14	7
range (pounds):	25/975	35/975	25/500	75/950
mean (pounds):	215.8	215.8	165.0	317.9
standard deviation (pounds):		201.6	157.3	293.2
base:	(49)	(28)	(14)	(7)

HANDLINE

PORT WHERE CATCH LANDED

Q: At which port do you land most of your catch?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
Kauai:				
Port Allen	7	3	3	1
Nawiliwili	5	4	1	0
Kukuiula	5	2	0	3
Oahu:				
Waianae	13	11	0	2
Maui:				
Maalaea	4	2	2	0
Hawaii:				
Hilo	15	6	7	2
Kawaihae	4	2	2	0
Honokahau	11	6	2	3
Keauhou	5	5	0	0
South Point	6	5	1	0
other (ports with three mentions or less	25	12	9	4
total	100	58	27	15

HANDLINE

SELL TO WHOLESALER

Q: How do you sell (your catch) to a wholesaler?

percent of catch to wholesaler	all handline (#)	tuna (#)	bottom (#)	mixed (#)
none	39	15	16	8
less than 25 percent	4	3	0	1
25 to 49 percent	6	5	0	1
50 to 74 percent	11	7	2	2
75 to 99 percent	3	3	0	0
100 percent	32	23	6	3
don't know/refuse	5	2	3	0
total	100	58	27	15
range:*	2/100%	10/100%	50/100%	2/100%
mean:*	75.8%	75.6%	87.5%	63.9%
standard deviation:*	--	32.2%	23.1%	39.8%

*excludes those selling "none" to wholesalers

HANDLINE

SELL TO RETAILER

Q: How do you sell (your catch) to a retailer?

percent of catch to retailer	all handline (#)	tuna (#)	bottom (#)	mixed (#)
none	61	34	16	11
less than 25 percent	4	3	0	1
25 to 49 percent	2	1	0	1
50 to 74 percent	13	8	3	2
75 to 99 percent	6	5	1	0
100 percent	9	5	4	0
don't know/refuse	5	2	3	0
total	100	58	27	15
range:*	5/100%	5/100%	50/100%	20/50%
mean:*	64.4%	64.1%	79.4%	36.3%
standard deviation:*	--	30.3%	23.4%	16.0%

*excludes those selling "none" to retailers

HANDLINE

SELL AT AUCTION

Q: How do you sell (your catch) at auction?

percent of catch at auction	all handline (#)	tuna* (#)	bottom (#)	mixed (#)
none	59	42	13	4
less than 25 percent	4	4	0	0
25 to 49 percent	4	1	2	1
50 to 74 percent	5	3	0	2
75 to 99 percent	6	3	0	3
100 percent	18	4	9	5
don't know/refuse	5	2	3	0
total	100	58	27	15
range:*	10/100%	10/100%	25/100%	30/100%
mean:*	76.2%	63.6%	87.7%	80.7%
standard deviation:*	--	34.3%	27.5%	25.7%

*excludes those selling "none" at auction

HANDLINE

WHERE CATCH SOLD

Q: Where do you sell the catch that you land?

percent of catch to wholesaler	all handline (#)	tuna* (#)	bottom (#)	mixed (#)
auction (Suisan)	23	7	9	7
markets	12	8	3	1
Hilo	8	8	0	0
hotels, restaurants	7	5	1	1
Kona	6	5	0	1
Honolulu	5	2	2	1
unspecified wholesaler	4	2	2	0
Maalaea	3	1	2	0
not sold	2	1	1	0
other/refuse	30	19	7	5
total	100	58	27	15

HANDLINE

FIXED COSTS

Q: In this set of questions, I would like to ask you about your fishing expenses for the last year.

	all handline		tuna				bottom				mixed			
	#	mean	#	range	mean	s.d.	#	range	mean	s.d.	#	range	mean	s.d.
boat mortgage payments	100	$1345	58	0/$37,000	$1790	$5259	27	0/$4,000	$520	$1242	15	0/$6000	$1111	$1862
trailer mortgage payments	99	$20	57	0/$2000	$35	$265	27	--	--	--	15	--	--	--
other loans for fishing purposes	100	$295	58	0/$1800	$507	$2449	27	--	--	--	15	--	--	--
interest rate on "other loans	5	14.4%	5	12/18%	14.4%	3.3%	--	--	--	--	--	--	--	--
licenses and fees	98	$161	56	0/$6000	$193	$858	27	$12/$970	$100	$207	15	$10/$703	$156	$237
boat insurance	92	$365	52	0/$5700	$474	$1091	26	0/$1600	$226	$451	14	0/$1075	$217	$318
trailer insurance	90	$5	51	0/$200	$6	$31	26	0/$100	$4	$20	13	0/$50	$6	$15
total		$2191			$3005				$850				$1490	

HANDLINE
VARIABLE COSTS

Q: In this set of questions, I would like to ask you about your fishing expenses for the last year.

	all handline		tuna				bottom				mixed			
	#	mean	#	range	mean	s.d.	#	range	mean	s.d.	#	range	mean	s.d.
engine repairs	99	$1014	58	0/$1000	$819	$1594	26	0/$20,000	$1287	$3895	15	0/$4000	$1297	$1150
hull repairs	99	$269	58	0/$5000	$271	$755	26	0/$3000	$298	$804	15	0/$2500	$210	$640
electronic equipment repairs	99	$105	57	0/$2000	$63	$271	27	0/$1800	$177	$363	15	0/$1200	$132	$302
fishing equipment repairs	98	$263	56	0/$4500	$289	$812	27	0/$1000	$99	$215	15	0/$3000	$459	$804
fuel and oil	93	$3298	51	$40/$1800	$3730	$4395	27	$150/$9600	$2320	$2690	15	$56/10800	$3590	$2795
fishing gear	96	$1520	54	0/$1500	$1692	$2871	27	0/$4000	$1072	$1118	15	0/$11,640	$1707	$3058
bait	95	$1259	53	0/$30,000	$1423	$4318	27	$18/$4800	$799	$1356	15	0/$7200	$1504	$2184
ice	92	$848	51	0/$8640	$1023	$1680	26	0/$2300	$512	$590	15	0/$2376	$838	$718
food and beverages	86	$846	48	0/$8000	$982	$1571	24	0/$1800	$323	$437	14	0/10000	$1275	$2573
unloading fees	78	$1252	43	0/$10000	$1024	$2374	22	0/$2600	$300	$636	13	0/$30000	$3619	$8159
salaries	99	--	57	--	--	--	27	--	--	--	15	--	--	--
commissions	100	--	58	--	--	--	27	--	--	--	15	--	--	--
share of fish	80	$2573	43	0/$50000	$3609	$9109	25	0/$6000	$768	$1608	12	0/$15000	$2621	$4492
total		$13247			$14925				$7955				$17252	

HANDLINE

HOURS SPENT ON REPAIRS

Q. About how many hours would you say you worked on boat related repairs and maintenance in the last year?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
others repair	7	4	2	1
one to 24 hours	12	6	5	1
25 to 48 hours	13	7	5	1
49 to 72 hours	11	7	3	1
73 to 96 hours	5	3	2	0
97 to 120 hours	15	9	2	4
121 to 200 hours	10	5	4	1
201 to 500 hours	12	8	1	3
501 to 1,000 hours	8	4	2	2
don't know/refuse	7	5	1	1
total	100	58	27	15

range:* 5 to 960 hours

mean:* 179.1 hours

*excludes those who do not make repairs

HANDLINE

WHERE REPAIRS DONE

Q. Where do you normally make your repairs?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
at home	66	41	16	9
other	34	17	11	6
total	100	58	27	15

HANDLINE

WHERE REPAIRS DONE

Q. Where do you normally make your repairs?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
at home	66	41	16	9
other	34	17	11	6
total	100	58	27	15

HANDLINE

YEARS FISHED COMMERCIALLY

Q. For how many years have you been fishing commercially?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
zero to three years	23	12	8	3
four to six years	23	13	7	3
seven to 10 years	25	14	6	5
11 to 20 years	10	8	2	0
21 to 30 years	10	6	2	2
30 years and over	8	5	2	1
don't know/refuse	1	0	0	1
total	100	58	27	15

range: 0 to 45 years

mean: 10.9 years

HANDLINE

YEARS HANDLINING

Q. How many years have you been handline fishing?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
one to two years	17	8	7	2
three to five years	16	13	3	3
six to nine years	22	12	7	3
10 to 14 years	15	9	1	5
15 to 19 years	7	2	5	0
20 to 30 years	17	11	3	3
30 years or more	4	3	1	0
don't know/refuse	2	0	0	2
total	100	58	27	15

range: 1 to 40 years

mean: 10.9 years

HANDLINE

FISHING AS PRIMARY OCCUPATION

Q. Do you consider fishing your primary occupation?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
yes	44	31	9	4
no	56	27	18	11
total	100	58	27	15

HANDLINE

HAVE ANOTHER OCCUPATION

Q. Do you have another occupation?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
yes	59	30	18	11
no	41	28	9	4
total	100	58	27	15

HANDLINE

HOURS PER WEEK FISHING

Q. How many hours each week would you say you work at fishing, including preparation, actual fishing, selling your catch, and so on?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
less than 10 hours	10	7	3	0
10 to 19 hours	17	8	7	2
20 to 29 hours	18	8	6	4
30 to 39 hours	6	3	1	2
40 to 49 hours	8	3	4	1
50 to 59 hours	7	5	2	0
60 to 69 hours	14	9	2	3
70 to 79 hours	3	2	0	1
80 to 89 hours	5	3	1	1
90 to 100 hours	5	5	0	0
don't know/refuse	7	5	1	1
total	100	58	27	15
range:		0/100 hrs.	2/84 hrs.	10/80 hrs.
mean:		42.7 hrs.	28.9 hrs.	38.9 hrs.
standard deviation:		29.4 hrs.	20.5 hrs.	24.1 hrs.

HANDLINE

ANNUAL INCOME

Q. In which category does your annual income from fishing fall?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
less than $5,000	43	26	13	4
$5,000 to $10,000	14	5	6	3
$10,001 to $15,000	13	6	3	4
$15,001 to $20,000	8	4	3	1
$20,001 to $25,000	4	4	0	0
$25,001 to $30,000	6	4	0	2
$30.001 to $40,000	2	0	2	0
$40,001 to $50,000	3	3	0	0
$50,000 plus	5	4	0	1
don't know/refuse	2	2	0	0
total	100	58	27	15

estimated mean: $12,755

HANDLINE

RESIDENCE IN STATE

Q. Are you a lifetime resident of the state?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
lifetime	79	45	23	11
less than two years	2	1	1	0
two to five years	3	1	0	2
six to 10 years	2	2	0	0
10 years and over	14	9	3	2
total	100	58	27	15

HANDLINE

ETHNICITY

Q. What is your ethnic background?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
Caucasian	24	14	4	6
Chinese	1	0	1	0
Filipino	8	5	1	2
Hawaiian	22	17	2	3
Japanese	37	17	17	3
other/mixed	8	5	2	1
total	100	58	27	15

HANDLINE

AGE

Q. What is your age?

	all handline (#)	tuna (#)	bottom (#)	mixed (#)
25 to 34 years	23	15	6	2
35 to 44 years	39	23	9	7
45 to 54 years	17	10	4	3
55 to 64 years	15	8	5	2
65 years and over	6	2	3	1
total	100	58	27	15

estimated mean: 43.7 years

HANDLINE

GENDER

All 100 handline respondents were male.

VIII. OPENEDED RESPONSES: HANDLINE RESPONSES

HANDLINE (Q.45) - WHAT KIND OF CHANGES HAVE YOU MADE IN YOUR FISHING OPERATION SINCE YOU STARTED?

By far, the most noticeable difference in fishing operations over time has been the advent of electric or hydraulic reels and electronic equipment like the depth recorder and other equipment which help to locate fish. Improvments to existing equipment, better boats and synthetic materials have increased the quality of fishing in Hawaii.

On a personal level, the individual fisherman learns and grows from experience. Fishing becomes more efficient because the grounds become better known, crew members are added, signs are recognized (such as following porpoises), choice of bait and the way it is rigged up improves.

Other changes occur on a limited, individual basis as a product of necessity. As fuel has become more expensive, there is a tendency towards more bottom fishing than trolling, since it requires less fuel. A few fishermen mentioned that they no longer drop anchor, but instead float free with their lines out. Many fishermen mentioned the need to fish in deeper waters as the catch size in shallow waters has diminished over the years. Others have expanded on the number of species sought as a way to hedge against small catches for any one type of fish.

Altogether, technology was cited as the major change in handlining over the years. Homemade lines, outrigger canoes, and guesswork have given way, in most every case, to the advantages found in modern equipment.

(Q.46) - WHAT CHANGES HAVE YOU SEEN TAKE PLACE IN THE HANDLINE FISHERY SINCE YOU STARTED HANDLINE FISHING?

Most frequent answers to this question centered around the scarcity or apparently reduced numbers of fish, and an increase in the number of fishermen in general. The rise of ika shibi fishing in Hawaii in recent years received the third largest number of mentions, and it is these three points which made any substantial additions to items mentioned in the previous question (Q.45).

The scarcity of fish was expanded on by some respondents by comments about the need to fish deeper, that more small fry are being caught in relation to larger fish, and that fish are not coming to old grounds. Along with the comments about more fishermen came a few observations that there are more weekend handliners and that there has been a shift from tuna handlining to trolling and bottom fishing.

One other category of answers not yet mentioned mirrored the responses concerning personal changes, that is, the inroads of technology into commercial handling. Motorized equipment, electronics, improved materials and designs were all seen as major changes for this industry.

(Q.47) - WHAT PROBLEMS DO YOU SEE TODAY IN THE HANDLINE FISHERY?

The two greatest problems mentioned by nearly half of the respondents, were that there are less fish (especially less big fish) to be caught and that porpoises and sharks further reduce the size of the catch. The porpoise is blamed for eating the bait, damaging the lines and chasing fish away. At greater depths, sharks can take both the catch and the line.

The problem of less fish was joined by a variety of ancillary comments. Overfishing, competition from other fishermen, and foreign longliners fishing within the 200 mile limit were one category of answers. A lack of sufficient regulation to limit competition and overfishing were cited, and remedies included putting a minumum weight limit on fish caught, two year minimum residence before a person is eligible for a commercial license, licensing only commercial fishermen as a way to restrict weekend, recreational fishing, or raising the license fee for all but Hawaii residents. Still other responses relating to the scarcity of fish, found fault with Hawaii's fish aggregating buoys. Several respondents felt that the buoys ruin the natural migration patterns of the fish, that buoys kill younger fish (there was no explanation given for this possibility), that there are fewer big tuna since the buoys, and that the buoys are in the wrong locations.

The economics of handlining was the third major target area for comments. All costs, especially fuel costs, appeared to be rising faster than the price of fish. Many captains saw the fish markets, and not the fishermen, as the true profit makers from handlining. Some suggested a set minimum price on tuna; others felt that a better marketing scheme should exist for ahi to handle those times when high volume forces the price down.

Finally, an assortment of lesser complaints, ranging from the weather, to poor launch facilities, to the possibility of Hawaii's waters becoming a whale sanctuary, rounded out the overall picture drawn concerning problems in Hawaii's handline fishery.

HANDLINE - TYPICAL TRIP (Q25)

Handline fishermen were asked to describe a typical fishing trip as part of the handline survey. As in the longline survey, particular components of a trip were prelisted on the questionnaire as a guide to interviewers to gather complete information. In all, 100 handliners were questioned about their typical trips; a composite picture of their answers follows.

Busiest months for handline fishermen are June and July. The two largest groups of respondents made between six and 10 fishing trips during their busiest months (overall mean was 13 trips per month in the busiest month). Slowest months are February and March with nearly half of the respondents making between zero and three trips per month (overall mean was five trips per month in the slowest month).

Loading up takes place at the pier (if the boat is moored) or wherever a trailered boat is stored (usually at home). The equipment loaded includes poles, reels, pullers, radio, bottomfish rigs and depth recorder. Other items loaded are coolers, ice, bait, food and water. The median loading time is roughly one hour. A few respondents replied that most of their equipment is left on the boat between trips, but this appears to be the exception. Fuel is picked up either at the pier or enroute from home.

Because handline operations are on a much smaller scale than longlining, many fishermen will freeze their own ice or use a mixture of homemade and purchased ice. Amounts ranged from 45 pounds to 1200 pounds, depending on the size of the boat and length of the trip. Bait is usually bought at a local market or else the fishermen catch their own. To a lesser extent, bait is purchased from other fishermen, or a combination of purchased and caught bait is used. Bait is usually caught with lures and nets and may be caught fresh for the current trip, or kept frozen for later trips. Baitfish include opelu, akule, cuttlefish, squid, and aku belly (opelu and akule are preferred) and the usual amount of bait per trip is in the range of 25 to 30 pounds.

Transit to the fishing grounds can range from 15 minutes up to four hours, with most trips running around one hour in length. Typically, there is only the captain aboard, and he will spend his time steering the boat and trolling until he reaches the fishing grounds. Other crew members may troll, cut bait, rig lines, or simply rest until they arrive at the fishing grounds.

Depending on the fishing conditions and length of the trip, fishermen may stay in one location or move six or seven times in search of an area where the fishing is good. Bottomfishers and other handliners fishing closer to the shore commonly use chum released underwater at the depth of the hook to attract the fish. The other handline technique used is called "ika shibi." In this night fishery, lights are set out to attract squid which are caught and used for bait on handlines. Once the lines are baited set, boats are allowed to drift with a sea anchor which slows the drift.

The catch is either put directly on ice or kept in brine and then transferred to a cooler or ice box. Fishermen mentioned holding capacities which ranged from as little as 50 pounds up to two tons.

The return trip is generally comparable to the trip out, from one-half to two hours in length, but can take up to six hours. It is common to troll on the return in order to catch bait for the next trip. At the dock, or once the boat has been trailered, it is washed down, and gear and fish are unloaded. Some handliners will keep the entire catch for their own use, sell it, or give it to friends. Most truck the fish to market; trailer owners usually return home first before taking the catch to market, and some will wait until the following day. In some cases, the dock and market are one and the same (e.g., Suisan in Hilo) so the catch can be unloaded and sold at auction without having to truck the catch at all. A few will pack the fish and truck them to the airport for air freighting. Depending upon which procedure is used, and the size of the catch, unloading can take anywhere from 30 minutes to three hours.

This, then, is an overview of the basic components of all handline trips, as described to our interviewers. There is clearly a wide variety within handlining operations, although the variations appear to be logical extensions of the type of fish caught, equipment, and time commitment on the part of the fishermen.

APPENDICES

A. NMFS Cover Letter, Longline and Handline

B. Mailout Questionnaire

C. Longline Survey Instrument

D. Handline Survey Instrument

APPENDIX A

NMFS COVER LETTER

LONGLINE AND HANDLINE

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

June 14, 1982

Dear

The National Marine Fisheries Service is conducting a fishery assessment study of the longline fishery in Hawaii. We would appreciate your assistance since you understand the costs, the difficulties, and the opportunities of longlining. We would like to utilize your experience to better understand how government policies and programs affect your fishing operations.

We have hired a local research firm, Hawaii Opinion Inc., to help us in interviewing the owners or captains of every longline boat in Hawaii. Someone from their office will be calling you shortly to set up a convenient interview time. We do not want to interfere in your fishing schedule in any way and we can assure you that no one will see these interviews except the researchers. Everything you tell us will be strictly confidential. We sincerely hope you will help Hawaii Opinion in any way you can.

Your kokua would be a valuable part of this study. If you have any questions about this project, please call me or Sam Pooley, our fisheries economist, at 946-2181.

Mahalo.

Sincerely,

Richard S. Shomura
Director

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

September 30, 1982

Dear

The National Marine Fisheries Service is conducting a fishery assessment study of the handline fishery in Hawaii. Because we do not know whether you are actually engaged in handline fishing, and we will not be able to contact all the owners of handline boats, we will be interviewing a random sample of vessel owners. Consequently, if you are engaged in handline fishing, we would appreciate your assistance since you understand the costs, the difficulties, and the opportunities of commercial fishing in Hawaii. We would like to utilize your experience to better understand how government policies and programs affect your fishing operations.

We have hired a local research firm, Hawaii Opinion, Inc., to help us in interviewing the owners of handline boats in Hawaii. Someone from their office will be calling you shortly to determine if you are engaged in ika-shibi or other types of deep-sea handline fishing and to set up a convenient interview time. We do not want to interfere with your fishing schedule in any way, and we can assure you that no one will see the interview forms except the researchers. Everything you tell us will be strictly confidential.

We sincerely hope you will help Hawaii Opinion in any way you can. Your kokua will be invaluable to this study. If you have any questions about this project, please call me or Sam Pooley, our industry economist, at 946-2181.

Mahalo.

Sincerely,

Richard S. Shomura
Director, Honolulu Laboratory

APPENDIX B

MAILOUT QUESTIONNAIRE

HAWAII OPINION, INC.

1154 Fort Street Mall, Suite 417 • Honolulu, Hawaii 96813 • (808) 536-4975

October 28, 1982

Mr. Robert J. Ventura
RR 1, Box 485-C
Kula, HI 96790

Dear Mr. Ventura:

We plan to begin our study of handline fisheries in the next two weeks. In order to make this as convenient for you as possible, we would appreciate it if you would answer the following questions and return this page to us by no later than November 3, 1982.

Please mail your answers to us, whether or not you are engaged in handline fishing, since this will tell our interviewers whether they should contact you or not. A business reply envelope is enclosed for your convenience.

1. Are you currently engaged in handline fishing?

YES |__| NO |__|

IF YES:

2. What is a current telephone number where we can reach you to set up an interview appointment?

_____
Telephone Number

3. Do we have your correct mailing address? If not, what is the correct address?

_____

_____

Mahalo for your help.

Sincerely,

Ray Soon
Principal

RS:sk

APPENDIX C

LONGLINE SURVEY INSTRUMENT

OMB 0648 0117
Exp. 29 February 83

INTERVIEWER_____

DATE_____

ISLAND [ ]

I.D.# _____

LONGLINE AND HANDLINE FISHERY STUDY
Hawaii Opinion, Inc.
June, 1982

Hello, I'm _____ from Hawaii Opinion, Inc., a professional research company. We're working as consultants to the National Marine Fisheries Service of the U. S. Department of Commerce to develop information about the longline fishery in Hawaii. As you may know, there are 22 longline vessels operating out of Hawaii, and we will be inteviewing the captains or owners of all of those vessels.

Your frank and open answers will help the National Marine Fisheries Service to develop programs and policies which are beneficial to the local fishing industry. All of your answers will be strictly confidential, and will not be used by or available to any other governmental agency.

First, I'd like to ask you some questions about your boat, its engine, and the gear you use.

(VESSEL NAME_____)

1. What is the length of your boat? . . . . . _____ feet

2. What is the capacity or tonnage of your boat? . . . _____ net tons

3. How many years have you owned your present boat? . . _____ years

4. When was the boat built? . . . . . 19 [ ][ ]

5.* What was the cost of the boat when you purchased it? . . . . . .$_____

6.* What would you say is the value of the boat today? .$_____

7.* Tell me, do you own this boat by yourself? (IF NO:) How is it owned -- in partnership, by a corporation, or do you have another form of ownership?

sole proprietorship 1

partnership 2

corporation 3

other (SPECIFY)_____ 4

8.* And how was the boat originally financed? (CHECK ALL APPLICABLE CATEGORIES) What percentage of the total cost was paid for by (EACH CHECKED CATEGORY) ?

a. [ ] personal funds _____%

b. [ ] other investors _____%

c. [ ] regular loan from a bank _____%

d. [ ] government guaranteed loan _____%

e. [ ] other (SPECIFY) _____%

_____

9.* (IF LOANS USED TO PURCHASE VESSELS, ASK:) How many years were those loans for and what were the interest rates?

a. _____years _____% $_____

b. _____years _____% $_____

c. _____years _____% $_____

10.* What do you think all of the electronic equipment on board your boat is worth? . . . . . .$_____

11. What horsepower is your boat's engine? . . . . . _____

12. How many years have you been using the engine you are using now? . . . . . _____ years

13.* How much did the engine cost? . . . . . .$_____

14.* And what do you think its value is today? . . . . .$_____

15. When you're in transit--for example, when you are going from port to your fishing grounds--what is your average speed? . . . . . _____ knots

or

_____ mph

16. What is your engine's fuel consumption--how many gallons per hour do your engines require? . . . . . _____ gal/hour

Now I'd like to ask you about the gear you use for fishing and how much it would cost to replace each type of gear.

17.* How much would it cost to replace all of the ropes, hooks, swivels, leaders, weights, and floats you have at this time?

$_____
replacement cost

18.* How many reels do you have? (REPEAT FOR EACH ITEM)

number

a. reels and winches _____

b. gurdies and linehaulers _____

c. baskets and feet of line _____

TRIP

19. For the average month in the last year, could you tell me approximately how many fishing trips you took?

_____
monthly average/number of trips

20. Which months of the year are your busiest months: And about how many trips do you make during each of those months?

_____ to _____ no. of trips/month _____

_____ to _____ no. of trips/month _____

21. Which months of the year are your slowest? And about how many trips do you make during each of those months?

_____ to _____ no. of trips/month _____

_____ to _____ no. of trips/month _____

22. What would you say was the average duration of each of your fishing trips in the last year? That is, about how many days or hours did you stay out each time?

days . . . . . _____
or
hours . . . . . _____

23. On the average, how many hooks do you use on each set?

hooks per set . . . . . _____

24. At what pier is your boat moored?

_____ 1

_____ 2

_____ 3

_____ 4

other (SPECIFY) _____ 5

25. Now I would like you to think of the distances you traveled last year in your boat to reach various fishing grounds. (SHOW CARD) Please look at the distances listed on this card. First, tell me which of these distances from shore represent fishing grounds that you use. Then I need to know what percent of your total fishing time for the year was spent in each of the areas you used.

26. (INTERVIEWER: FOR THOSE CATEGORIES CHECKED IN QUESTION 25, ASK:)
When you fish _____ to _____ miles out, how many sets do you lay on each trip?

CHECK CATEGORIES USED	25. distance		26. sets/trip
☐	zero to three miles	_____ %	_____ sets per trip
☐	four to 12 miles	_____ %	_____ sets per trip
☐	13 to 50 miles	_____ %	_____ sets per trip
☐	51 to 100 miles	_____ %	_____ sets per trip
☐	101 to 200 miles	_____ %	_____ sets per trip
☐	over 200 miles	_____ %	_____ sets per trip
		100%	

(INTERVIEWER: BE SURE PERCENTAGES TOTAL 100%)

27. Now I'd like to ask you to describe a typical trip, step by step. Start with the loading process.....

(INTERVIEWER: FILL IN THE OUTLINE AS THE RESPONSE DEVELOPS; IF NECESSARY, PROMPT RESPONDENT TO COVER ITEMS IN THE RIGHT HAND COLUMN)

loading	items loaded, amounts
	time spent
getting bait	location(s)
	method, gear
	time spent
transit to fishing grounds, holoholo	time spent
	crew activity
fishing	individual crew tasks (methods and gear)
	time spent, capacity
	icing method
return/unloading	time spent returning
	method of transfer from boat to market
	time spent unloading
marketing/accounting	percent catch to market
	percent catch for overhead
	method of crew payment
repairs	kind, amount of own maintenance (separate for hull, engine, electronics and major gear, minor gear)
	location of hired maintenance
	source of replacement supplies

CREWS AND WAGES

28. What is the average or usual number of people aboard your boat on a fishing trip? (INTERVIEWER: INCLUDE RESPONDENT IF HE IS ON BOARD)

_____

29. Do you captain the boat on fishing trips or does someone else do that?

owner is captain 1

someone else is captain 2

30.* Do you pay your crew only in wages, do you pay them by giving them a percentage of the catch, or do you do both?

all in wages 1

GO TO Q.31 — all in catch 2

both 3

*30a. What percentage of their pay is in wages? _____%

→ *30b. What were your average wages to a crew member in 1981?

either: $_____/trip

$_____/month

$_____/day

$_____/hour

IF PAY CREW PARTIALLY OR TOTALLY IN PERCENTAGE OF CATCH

31.* When you share the proceeds from the catch as part or all of the wages paid to crew members, what percentage of the total catch is given to the crew members?

_____%

32.* (IF CAPTAIN IS OTHER THAN OWNER) What portion of the catch does the captain receive?

_____%

33.* (IF CAPTAIN IS OTHER THAN OWNER) What did you pay the captain in wages in 1981?

either: $_____/trip

$_____/month

$_____/day

$_____/hour

34.* Does the remaining percentage of the catch go to you, the owner?

yes 1

no 2

*34a. Where does the remainder of the catch go?

paid to . . . _____

_____%

CATCH AND REVENUE

35.* Now we need to get some information about your fish catches for the past year. I would like to ask you about your catches of bigeye, yellowfin, albacore, ono, mahimahi, marlin, and any other species of fish which you might have caught in 1981. (USE CARD--GO THROUGH a, b, c, AND d FOR EACH SPECIES OF FISH)

	a. Did you catch any (NAME) during 1981	b. How many total lbs. did you catch?	c. How many lbs. did you sell?	d. What was the total amount you sold your fish for in 1981
bigeye				
yellowfin				
albacore				
ono				
mahimahi				
marlin				

Were there any other species of fish that you caught a lot of in 1981? (REPEAT a, b, c, AND d FOR EACH OF THOSE MENTIONED) (INTERVIEWER: THIS IS NOT CRITICAL)

36. At which port do you land most of your catch? _____

37. About what percent of your total catch would you say you bring in to (ANSWER TO Q.36)?

_____%

38. The catch that you land at (ANSWER TO Q.36) --where do you sell it?

_____

39. And how do you sell it -- to a wholesaler, to a retailer, or by auction?

wholesaler . . . . . 1 ____%

retailer . . . . . 2 ____%

auction . . . . . 3 ____%

IF RESPONSE TO Q.37 IS 100%, SKIP TO Q.44

40. (IF LESS THAN 100%) What other port do you land your catch at?

_____

41. What percent would you say you bring into (ANSWER TO Q.40) ? _____%

42. The catch that you land at (ANSWER TO Q.40) --where do you sell it? (INTERVIEWER: THIS IS NOT CRITICAL)

_____

43. And how do you sell it -- to a wholesaler, to a retailer, or by auction? (INTERVIEWER: THIS IS NOT CRITICAL)

wholesaler 1

retailer 2

auction 3

COSTS

44.* In this set of questions, I would like to ask you about your fishing expenses for 1981.

FIXED COSTS

Boat Payments:

a.* (IF LOAN USED TO PURCHASE BOAT, ASK:) How much did you pay in mortgage payments on your boat in 1981?
total payment . . . . . $_____

Other Loans:

b.* Do you have any other loans taken out for fishing purposes, such as for equipment?

(IF NO, GO TO "c"; IF YES, ASK:) How much did you pay in loan payments in 1981? Can you tell me what the interest rate is on that loan?
total . . . . . $_____
interest rate . . . . . _____%

c.* What is the total amount you spent for licenses and fees, such as your excise tax license, your commercial fishing license, and your boat registration?
licenses and fees . . . $_____

d.* How much did you spend, if anything, for administrative assistance such as accounting legal assistance, etc.?
administrative expenses $_____

VARIABLE COSTS

e.* How much did you spend on engine repairs? repairs on the hull? repairs on any electronic equipment? fishing equipment repairs?
engine repairs . . . . $_____
hull repairs . . . . . $_____
electronic equipment . $_____
fishing equipment repairs $_____

f.* How much did you spend on fuel and oil for your boat in 1981?
boat fuel and oil . . . . $_____

g.* What is the total amount you spent in 1981 for fishing gear such as ropes, floats, hooks, weights, reels, linehaulers, etc.?
gear . . . . . $_____

h.* How much did you spend on bait?
bait . . . . . $_____

i.* How much did you spend on ice?
ice . . . . . $_____

j.* How much was spent on food and beverages for you and others you may have had aboard?
food and beverages . . . $_____

k.* What were your total auction, sales and unloading fees for 1981?
unloading fees . . . . . $_____

l.* What is total amount you spent on salaries commissions, and "share-of-fish" to persons who help aboard your boat?
salaries . . . . . $_____
commissions . . . . . $_____
share-of-fish . . . . . $_____

m.* What is the total amount you spent on FICA and FUTA?
FICA . . . . . $_____
FUTA . . . . . $_____

estimate total $_____

45. Do you personally do any of your own repairs and maintenance on your boat or fishing equipment?

yes 1

no 2

(IF YES, ASK:) About how many hours would you say you worked on boat related repairs and maintenance in 1981?

_____hours

46. Where do you normally make your repairs? _____ 1

_____ 2

_____ 3

47. For how many years have you been fishing commercially? _____years

48. How many years have been longline fishing? _____years

49. How many years with this vessel? _____years

Previous vessel? _____years

(INTERVIEWER; ASK Q. 50, Q. 51 AND Q. 52 ONLY OF THOSE WHO HAVE BEEN LONGLINE FISHING FOR MORE THAN FIVE YEARS)

50. What kinds of changes have you made in your fishing operation since you started?

_____

_____

_____

_____

_____

_____

_____

51. What changes have you seen take place in the longline fishery since you started longline fishing?

_____

_____

_____

_____

_____

_____

_____

52. What problems do you see today in the longline fishery?

_____

_____

_____

_____

_____

_____

_____

DEMOGRAPHICS

Our final set of questions are for classification purposes only.....

1. Do you consider fishing your primary occupation?

yes 1

no 2

2. How many hours each week would you say you work at fishing, including preparation, actual fishing, selling your catch, and so on?

_____ hours

3. I would like you to look at this card and tell me in which category your annual income from fishing falls into. (USE CARD) Just give the letter next to the proper category.

a. under $5,000 01

b. $5,000 to $10,000 02

c. $10,001 to $15,000 03

d. $15,001 to $20,000 04

e. $20,001 to $25,000 05

f. $25,001 to $30,000 06

g. $30,001 to $40,000 07

h. $40,001 to $50,000 08

i. more than $50,000 09

(don't know/no response) 99

4. Do you have another occupation?

yes 1

no . . . . . 2 <---------- GO TO Q.5

4a. What is this second occupation? _____

4b. How many hours each week would you say you work in (ANSWER TO 4a)?

_____ hours

5. Are you a lifetime resident of the State? (IF NO, ASK:) How many years have you lived in Hawaii?

lifetime 1

less than two years 2

two to five years 3

six to ten years 4

more than ten years 5

don't know/no response 9

6. What is your ethnic background?

Caucasian	1
Chinese	2
Filipino	3
Hawaiian/part-Hawaiian	4
Japanese	5
other/mixed	6
refused	9

7. Is your age.....(READ CATEGORIES)

under 25	1
25 to 34	2
35 to 44	3
45 to 54	4
55 to 64	5
65 or older	6
(refused)	9

That's all the question I have. I want to thank you very much for all your help and for going all the way through this interview with me.

(RECORD, DO NOT ASK:) Sex of respondent.....

male	1
female	2

APPENDIX D

HANDLINE SURVEY INSTRUMENT

OMB 0648 0117
Exp. 29 February 83

INTERVIEWER_____

DATE_____

ISLAND [ ]

I.D.# _____

LONGLINE AND HANDLINE FISHERY STUDY
Hawaii Opinion, Inc.
September, 1982

Hello, I'm _____ from Hawaii Opinion, Inc.. As you know, we are interviewing owners of handline fishing vessels for the National Marine Fisheries Service of the U. S. Department of Commerce. Your answers will help them to develop programs and policies which will benefit the local fishing industry.

All of your answers will be kept strictly confidential and will not be used by any other other governmental agency.

First, I'd like to ask you some questions about your boat, its engine, and the gear you use.

(VESSEL NAME_____)

1. What is the length of your boat? . . . . . _____ feet

2. What is the capacity or tonnage of your boat? . . . _____ net tons

3. How many years have you owned your present boat? . . _____ years

4. When was the boat built? . . . . . 19 [ ][ ]

5.* What was the cost of the boat when you purchased it? . . . . . $_____

6.* What would you say is the value of the boat today? . $_____

7.* Tell me, do you own this boat by yourself? (IF NO:) How is it owned -- in partnership, by a corporation, or do you have another form of ownership?

sole proprietorship 1

partnership 2

corporation 3

other (SPECIFY)_____ 4

8.* And how was the boat originally financed? (CHECK ALL APPLICABLE CATEGORIES) What percentage of the total cost was paid for by (EACH CHECKED CATEGORY) ?

a. [ ] personal funds _____%

b. [ ] other investors _____%

c. [ ] regular loan from a bank _____%

d. [ ] government guaranteed loan _____%

e. [ ] other (SPECIFY) _____%

_____

9.* (IF LOANS USED TO PURCHASE VESSELS, ASK:) How many years were those loans for and what were the interest rates?

a. _____years _____% $_____

b. _____years _____% $_____

c. _____years _____% $_____

10.* What do you think all of the electronic equipment on board your boat is worth? . . . . . $_____

11. What horsepower is your boat's engine? . . . . . _____

12. How many years have you been using the engine you are using now? . . . . . _____ years

13.* How much did the engine cost? . . . . . $_____

14.* And what do you think its value is today? . . . . . $_____

15. When you're in transit--for example, when you are going from port to your fishing grounds--what is your average speed? . . . . . _____ knots

or

_____ mph

16. What is your engine's fuel consumption--how many gallons per hour do your engines require? . . . . . _____ gal/hour

Now, about the gear you use for fishing .....

17.* How much would it cost to replace all of the ropes, hooks, swivels, leaders, and weights, you have at this time?

$_____
replacement cost

18.* How many linehaulers do you have? _____

TRIP

19. For the average month in the last year, could you tell me approximately how many fishing trips you took?

_____
monthly average/number of trips

20. Which months of the year are your busiest months: And about how many trips do you make during each of those months?

_____ to _____ no. of trips/month _____

_____ to _____ no. of trips/month _____

21. Which months of the year are your slowest? And about how many trips do you make during each of those months?

_____ to _____ no. of trips/month _____

_____ to _____ no. of trips/month _____

22. What would you say was the average duration of each of your fishing trips in the last year? That is, about how many hours did you stay out each time?

no. of hours. . . . . _____

23. Is your boat usually moored or is it kept on a trailer?

moored 1

trailer 2

23a. What is the distance you trailer your boat from where it is stored to where it is launched?

no. of miles . . _____

23b. At what pier is your boat moored?

_____ 1

_____ 2

_____ 3

_____ 4

other (SPECIFY) _____ 5

24. Now I would like you to think of the distances you traveled last year in your boat to reach various fishing grounds. (SHOW CARD) Please look at the distances listed on this card. First, tell me which of these distances from shore represent fishing grounds that you use. Then I need to know what what percent of your total fishing time for the year was spent in each of the areas you used.

CHECK CATEGORIES USED		(INTERVIEWER: BE SURE PERCENTAGES TOTAL 100%)		
☐	zero to three miles _____ %	☐	26 to 50 miles	_____ %
☐	four to 12 miles _____ %	☐	over 50 miles	_____ %
☐	13 to 25 miles _____ %	☐	over 200 miles	_____ %

25. Now I'd like to ask you to describe a typical trip, step by step. Start with the loading process.....

(INTERVIEWER: FILL IN THE OUTLINE AS THE RESPONSE DEVELOPS; IF NECESSARY, PROMPT RESPONDENT TO COVER ITEMS IN THE RIGHT HAND COLUMN)

loading _____ items loaded, amounts

_____

_____ time spent

getting bait _____ location(s)

_____ method, gear

_____

_____ time spent

transit to fishing grounds, holoholo _____ time spent

_____ crew activity

_____

fishing _____ time spent, capacity

_____ icing method

_____

return/unloading _____ time spent returning

_____ method of transfer from boat to market

_____

_____ time spent unloading

CREWS AND WAGES

26. What is the average or usual number of people aboard your boat on a fishing trip? (INTERVIEWER: INCLUDE RESPONDENT IF HE IS ON BOARD)

_____

27. Do you captain the boat on fishing trips or does someone else do that?

owner is captain 1

someone else is captain 2

28.* How do you pay your crew? Do you pay them wages, a percentage of the catch or does it vary?

28a. all wages ☐ average wage to a crew member: $_____/trip

$_____/month

$_____/day

$_____/hour

28b. percentage of catch and wages ☐

_____

_____

_____

_____

28c. method of pay varies ☐

_____

_____

_____

_____

29.* (IF CAPTAIN IS OTHER THAN OWNER) What portion of the catch does the captain receive?

_____%

30.* (IF CAPTAIN IS OTHER THAN OWNER) What did you pay the captain in wages in the last year?

either: $_____/trip

$_____/month

$_____/day

$_____/hour

31.* Does the remaining percentage of the catch go to you, the owner?

yes 1

no 2

*31a. Where does the remainder of the catch go?

paid to . . ._____

_____%

CATCH AND REVENUE

32.* Now we need to get some information about the fish catch for your last trip. I would like to ask you about your catch of bigeye, yellowfin, opakapaka, onaga, ono, ehu, and any other species of fish which you might have caught on your last trip. (USE CARD--GO THROUGH a, b, c, AND d FOR EACH SPECIES OF FISH)

	a. Did you catch any...	b. How many total lbs. did you catch?	c. How many lbs. did you sell?	d. What was the total amount you sold this species of fish for in 1984?
bigeye				
yellowfin				
opakapaka				
onaga				
ono				
ehu				

32a. Were there any other species of fish that you caught on your last trip? (REPEAT a, b, AND c FOR EACH OF THOSE MENTIONED) (INTERVIEWER: THIS IS NOT CRITICAL)

33. Compared to all the other trips you take during the year, would you say the size of the catch for this last trip was typical or average?

GO TO Q.34 ---------- yes 1

---------- no 2

▼

33a. What is the weight of your average catch on a fishing trip?

lbs._____

34. At which port do you land most of your catch? _____

35. About what percent of your total catch would you say you bring in to (ANSWER TO Q.34)?

_____

36. The catch that you land at (ANSWER TO Q.34) --where do you sell it?

37. And how do you sell it -- to a wholesaler, to a retailer, or by auction?

wholesaler . . . . . 1 ____

retailer . . . . . 2 ____

auction . . . . . 3 ____

IF RESPONSE TO Q.35 IS 100%, SKIP TO Q.40

37. (IF LESS THAN 100%) What other port do you land your catch at?

38. What percent would you say you bring into (ANSWER TO Q.37) ? _____%

COSTS

40.* In this set of questions, I would like to ask you about your fishing expenses for the last year.

FIXED COSTS

a.* (IF LOAN USED TO PURCHASE BOAT, ASK:) How much did you pay in mortgage payments on your boat in the last year?

Boat Payments:
total payment . . . . . $_____

b.* How much did you pay in mortgage payments on your trailer in the last year?

Trailer Payments:
total payment . . . . . $_____

c.* Do you have any other loans taken out for fishing purposes, such as for equipment?

(IF NO, GO TO "d"; IF YES, ASK:) How much did you pay in loan payments in the last year? Can you tell me what the interest rate is on that loan?

Other Loans:
total . . . . . $_____
interest rate . . . . . _____%

d.* What is the total amount you spent for licenses and fees, such as your excise tax license, your commercial fishing license, and your boat registration?

licenses and fees . . . $_____

e.* How much did you pay for insurance on your boat? on your trailer?

boat insurance . . . . $_____
trailer insurance . . . $_____

VARIABLE COSTS

f.* How much did you spend on engine repairs? repairs on the hull? repairs on any electronic equipment? fishing equipment repairs?

engine repairs . . . . $_____
hull repairs . . . . . $_____
electronic equipment . $_____
fishing equipment repairs $_____

g.* How much did you spend on fuel and oil for your boat in the last year?

boat fuel and oil . . . . $_____

h.* What is the total amount you spent in the last year for fishing gear such as ropes, floats, hooks, weights, reels, linehaulers, etc.?

gear . . . . . $_____

i.* How much did you spend on bait?

bait . . . . . $_____

j.* How much did you spend on ice?

ice . . . . . $_____

k.* How much was spent on food and beverages for you and others you may have had aboard?

food and beverages . . . $_____

l.* What were your total auction, sales and unloading fees for the last year?

unloading fees . . . . . $_____

m.* What is total amount you spent on salaries commissions, and "share-of-fish" to persons who help aboard your boat?

salaries . . . . . $_____
commissions . . . . . $_____
share-of-fish . . . . . $_____

estimate total $_____

41. Do you personally do any of your own repairs and maintenance on your boat or fishing equipment?

yes 1

no 2

(IF YES, ASK:) About how many hours would you say you worked on boat related repairs and maintenance in the last year?

_____hours

42. Where do you normally make your repairs? _____ 1

_____ 2

_____ 3

43. For how many years have you been fishing commercially? _____years

44. How many years have you been handline fishing? _____years

(INTERVIEWER; ASK Q.45, Q.46 AND Q.47 ONLY OF THOSE WHO HAVE BEEN HANDLINE FISHING FOR MORE THAN FIVE YEARS)

45. What kinds of changes have you made in your fishing operation since you started?

_____

_____

_____

_____

_____

_____

_____

46. What changes have you seen take place in the handline fishery since you started handline fishing?

_____

_____

_____

_____

_____

_____

_____

47. What problems do you see today in the handline fishery?

_____

_____

_____

_____

_____

_____

_____

DEMOGRAPHICS

Our final set of questions are for classification purposes only.....

1. Do you consider fishing your primary occupation?

yes 1

no 2

2. How many hours each week would you say you work at fishing, including preparation, actual fishing, selling your catch, and so on?

_____hours

3. I would like you to look at this card and tell me in which category your annual income from fishing falls into. (USE CARD) Just give the letter next to the proper category.

a. under $5,000 01

b. $5,000 to $10,000 02

c. $10,001 to $15,000 03

d. $15,001 to $20,000 04

e. $20,001 to $25,000 05

f. $25,001 to $30,000 06

g. $30,001 to $40,000 07

h. $40,001 to $50,000 08

i. more than $50,000 09

(don't know/no response) 99

4. Do you have another occupation?

yes 1

no . . . . . 2 <---------- GO TO Q.5

4a. What is this second occupation? _____

4b. How many hours each week would you say you work in (ANSWER TO 4a)?

_____hours

5. Are you a lifetime resident of the State? (IF NO, ASK:) How many years have you lived in Hawaii?

lifetime 1

less than two years 2

two to five years 3

six to ten years 4

more than ten years 5

don't know/no response 9

6. What is your ethnic background?

Caucasian	1
Chinese	2
Filipino	3
Hawaiian/part-Hawaiian	4
Japanese	5
other/mixed	6
refused	9

7. Is your age.....(READ CATEGORIES)

under 25	1
25 to 34	2
35 to 44	3
45 to 54	4
55 to 64	5
65 or older	6
(refused)	9

That's all the questions I have. I want to thank you very much for all your help and for going all the way through this interview with me.

(RECORD, DO NOT ASK:) Sex of respondent.....

male	1
female	2

84-8

SOUTHWEST FISHERIES CENTER

HONOLULU LABORATORY

P.O. BOX 3830

HONOLULU, HI 96812

NATIONAL MARINE FISHERIES SERVICE

May 1984

LIBRARY

JUN 7 1984

National Marine Fisheries Service
2570 Dole Street
Honolulu, Hawaii

INVENTORY OF U. S. VESSELS IN THE CENTRAL AND WESTERN PACIFIC. PHASE I--SUMMARY OF PUBLIC RECORD

ROBERT A. SKILLMAN, JAMES C. COOPER, and DANIEL R. LOCEY

Southwest Fisheries Center Honolulu Laboratory
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96812

Not for Publication

ADMINISTRATIVE REPORT H-84-8

INTRODUCTION

With implementation of the Magnuson Fishery Conservation Management Act (MFCMA) in 1976, the Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service (NMFS), became responsible for providing much of the biological and economic assessments as well as general data summaries for use in developing fishery management plans. In the process of carrying out these assessments and data analyses, it became clear to the NMFS and the Western Pacific Regional Fishery Management Council (Council), which has the responsibility of actually preparing the fishery management plans, that an up-to-date, detailed vessel inventory was needed for the central and western Pacific. Such an inventory could be used, it was felt at the time (circa early 1980), as a statistical frame for biological and socioeconomic surveys and as a basis for describing the fisheries occurring in the area.

As it turned out, this belief was too optimistic. As will be described in some detail in the following paragraphs, the public record proved to be incomplete or substantially out of date in some areas while in other cases vessels used for fishing could not be effectively separated from other usages, particularly a general pleasure category. Because of this, a second phase of the vessel inventory was initiated by the Council in cooperation with the Hawaii Division of Aquatic Resources and the Southwest Fisheries Center Honolulu Laboratory. The second phase involves the use of a questionnaire in Hawaii to supplement the available information, incorporation of more complete and accurate data that have become available from American Samoa and the Northern Mariana Islands, and updating the data files in Guam through contacts with fishermen organizations. The results of the second phase will be reported separately.

Thus with the support of the Council, the NMFS initiated what has come to be known as Phase I of the vessel inventory study by issuing a contract to assemble vessel data from the public records in American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and Hawaii. Vessels not documented or registered in these areas were not included in the inventory, except in the Northern Mariana Islands where the public record was supplemented. The project was undertaken by SMS Research, Inc. (Contract No. 80-ABC-00187) in September 1980.

Presented in this report are some simple summaries and cross tabulations showing the composition of the vessel population in each of the island areas in the central and western Pacific. The summaries are based on the computer tape submitted to the NMFS by the contractor in December 1981. The contractor's final report describes the data sources, problems in assembling the data, quality and completeness of the inventory, and the organization of the data on the computer tapes.

SOURCES AND DESCRIPTION OF DATA

American Samoa

At the time of this survey, the only public record of vessels in the Territory of American Samoa was that maintained by the U.S. Coast Guard in Pago Pago. They initiated the registration of boats in December 1973 and revised the data form in October 1976. This registration is not equivalent to "documentation" in the usual U.S. Coast Guard sense.

The inventory includes statistics on the owner, usage, boat configuration, and registration data. A total of 155 vessels are in the inventory. The computer tape format is shown in Figure 1.

The contractor described the quality of the data as being substantially incomplete, inaccurate, and out of date.

Guam

In the Territory of Guam, the public record in 1981 consisted of <600 vessels registered by the Guam Department of Public Safety and approximately 30 vessels documented by the U.S. Coast Guard Public Safety Office. The computerized data file includes information on the owner, registration data, and more detailed data on usage and vessel statistics. The computer tape format is shown in Figure 2.

The subcontractor (Pacific Basin Environmental Consultants) felt that the data from Guam Department of Public Safety Office represented a nearly complete inventory, but that it contained many outdated records and the address information contained the physical location of the owner not the mailing address.

Hawaii

In the State of Hawaii, there are two sources of vessel information. Vessels of 5 net tons or more must be documented with the U.S. Coast Guard if they are commercial vessels while pleasure boats may be at the option of the owner. If a vessel is not documented, it must be registered at the Harbors Division, Department of Transportation, State of Hawaii. Presumably, a vessel could be both documented and registered, but then it would have to have both identification numbers affixed to its hull. Because of this and other considerations, we feel that few boats would be both documented and registered. Vessels must be registered every year, while the computer file is updated quarterly. The data from both of these sources were placed on a single computer tape with a format encompassing the different types of information available from each source (Fig. 3a, b). Information includes the owner's name and address, vessel statistics, and usage of the vessel. There are 16,612 registered and 1,146 documented vessels on the computer tape.

The contractor believes both data records to be substantially up to date, correct, and accurate.

Northern Mariana Islands

For the Commonwealth of the Northern Mariana Islands, the contractor assembled statistics from several sources. These sources include the U.S. Coast Guard, which began registering vessels in early 1980, the Division of Marine Resources, which completed a survey of fishing vessels in 1981, and a special survey conducted on Rota by a subcontractor. The computer tape format is shown in Figure 4. The tape contains data on 32 Saipan vessels originating from the U.S. Coast Guard, 35 full-time and 105 part-time fishing boats from the Division of Marine Resources, and 9 vessels from the subcontractor.

The subcontractor indicated that the data from the last two sources were substantially current and accurate, and represent a considerable improvement over the U.S. Coast Guard data.

DATA SUMMARIES

American Samoa

For American Samoa, we did a simple cross tabulation of vessel usage by type of propulsion for the 155 vessels in the inventory. Most of the vessels (70) had neither usage nor type specified (Table 1). The largest usage category specified (61) was pleasure with the most common types being outboard powered (32) and inboard powered (20). There were 10 vessels identified as commercial fishing with the most common types being outboard (4) and inboard powered (5).

Guam

Table 2 presents the same results for Guam, that is a simple cross tabulation of vessel usage by propulsion type. Of the 734 vessels in the inventory, 672 were categorized as pleasure; most of these (511) were outboard powered. Only nine were designated as being commercial fishing vessels, and most of these were outboard powered.

Hawaii

For the vessel inventory from Hawaii, we have compiled information by both documented and registered vessels and compiled a number of cross tabulations to make use of the greater array of information available. Both the documented and registered segments of the data file contain a usage category called passenger/fishing (including charter). The category in practice seems to include only charter fishing boats, and we will refer to it as such in the text.

The same simple cross tabulation of vessel usage by propulsion type was compiled for Hawaii, except in this case by documented (Table 3a) and registered (Table 3b) vessels separately. For the documented vessels, the "oil screw" (diesel engine) type of propulsion was the most common for virtually all usage categories whereas for the registered vessels, outboard powered followed by inboard-outboard boats were the most common in nearly

all usage categories. Between the outboard and oil screw propulsion types for registered and documented vessels, respectively, the proportion of usage categories differs considerably as indicated in Figure 5.

Table 4 contains a simple frequency count by the length of the vessels. Registered vessels tend to be smaller as would be expected; the mode is 16 ft (5 m; 1,910 vessels or 11.5% of the total). The mode (the most abundant class) for documented is 36 ft (11 m; 67 vessels or 5.8%). The total number of registered boats in 1981 was 16,612 while that of documented vessels was 1,146, for a total of 17,758 vessels in the inventory of Hawaii.

Table 5 contains a cross tabulation of vessel usage by arbitrary length categories of the vessels for both documented and registered vessels combined. The most commonly recorded usage of boats in Hawaii was pleasure followed by commercial fishing. Other usages apparently involving fishing include charter fishing boats, passenger/fishing/towing, passenger/ocean research, fishing/ocean research, passenger/fishing/towing, and ocean research. Within the pleasure usage, the most common size was 16-24 ft (5-7 m) followed by the <14 ft (4 m) category. Because of the preponderance of pleasure vessels, the overall distribution by vessel size category appears nearly the same. Within commercial fishing usage, the most vessels again fell within the 16-24 ft (5-7 m) category, but the next most abundant categories were larger sized vessels, namely 25-30 ft (8-9 m) and 31-40 ft (>9-12 m) (Fig. 6).

Table 6a represents the frequency of vessel usage categories by the recorded island for registered boats in Hawaii. The latter category apparently represents the location of the boat. It can be seen that Oahu has the most boats by all usages. However, for commercial fishing boats, the Island of Hawaii has nearly as many vessels as Oahu, and Kauai is well represented. The recordings for Bougainville (in the Solomon Islands), California, Spain, and Tahiti are not easily explained. In Table 6b, frequencies of documented vessels by vessel usage and island of residence of the owner is given. The U.S. Coast Guard file of documented vessels contained on the computer tape does not include the actual location of the vessel; residences outside the State of Hawaii were placed in the category "other" in this summary. Again, most vessels by all usage categories appear to be located on Oahu. Most commercial fishing vessels appear to be on Oahu, followed by Hawaii and Maui. The percent occurrence of pleasure, commercial fishing, and charter boat usages are shown in Figure 7 by island.

Table 7 contains the distribution of registered vessels for type of vessel by usage category. Open motorboats were the most frequent type for both pleasure and commercial fishing usages. For commercial fishing, the cabin motorboat was the second most important type of vessel, but sailboats and auxiliary powered sailboats were also represented.

In Table 8 the frequency of registered vessels for type of vessel by type of propulsion is given. Most open motorboats and runabouts are outboard powered while most cabin motorboats are inboard-outboard powered. The distribution of propulsion type for sailboats indicates that the registrants do not understand how to complete the registration form.

Table 9 presents a cross tabulation of fuel type by vessel usage for Hawaii registered vessels. Most vessels fell in the joint category of using gasoline and pleasure usage. The fuel classification is not very useful because of the existence of the "other" category as well as missing values (not specified) and an "undefined code" in the data base.

The distribution of registered vessels for fuel type by propulsion type is given in Table 10. Most vessels using gasoline are outboard or inboard-outboard powered, whereas most vessels using diesel are inboard powered or are sailboats with an inboard engine. Most of the "other" and "undefined code" fuel types appear to be vessels with sail power only.

In Table 11 the frequency of registered vessels for usage by hull material is presented for all usage categories except "dealer." Fiber glass is the most common hull material and wood is the second most common.

Northern Mariana Islands

All of the vessels in the current inventory for the Commonwealth of the Northern Mariana Islands were outboard powered (Table 12). The usage of most of the vessels was not specified; of the seven that were specified, four were designated as commercial fishing.

Table 1.--Frequency of American Samoa vessels for vessel usage by type of propulsion.

Usage	Not specified	Outboard	Inboard	Inboard-outboard	Sailing only	Sailing inboard	Sailing outboard	Manual	Other	Total
Pleasure	1	32	20	6	1	1	0	0	0	61
Commercial fishing	0	4	5	1	0	0	0	0	0	10
Passenger carrying	0	11	0	0	0	0	0	0	0	11
Livery	1	0	0	0	0	0	0	0	0	1
Manufacturer	0	0	1	0	0	0	0	0	0	1
Miscellaneous	0	0	1	0	0	0	0	0	0	1
Not specified	70	0	0	0	0	0	0	0	0	70
Total	72	47	27	7	1	1	0	0	0	155

Table 2.--Frequency of Guam vessels for vessel usage by type of propulsion.

Usage	Not specified	Outboard	Inboard	Inboard-outboard	Sailing only	Sailing inboard	Sailing outboard	Manual	Other	Total
Pleasure	4	511	49	25	28	22	31	0	2	672
Commercial fishing	2	5	2	0	0	0	0	0	0	9
Passenger/fishing[1]	2	0	1	0	0	0	0	0	0	3
Passenger carrying	8	7	1	1	0	0	0	0	0	17
Other commercial	0	5	3	0	0	0	0	0	0	8
Dealer	2	1	0	0	0	0	0	0	0	3
Miscellaneous	0	1	0	0	0	0	0	0	0	1
Freight only	4	0	0	0	0	0	0	0	0	4
Towing (tug)	7	0	0	0	0	0	0	0	0	7
Not specified	4	5	0	1	0	0	0	0	0	10
Total	33	535	56	27	28	22	31	0	2	734

[1]Includes charter.

Table 3a.--Frequency of Hawaii documented vessels for vessel usage by type of propulsion.

Usage	Not specified	Barge	Dredge	Gas			Oil				Documented total
				Catamaran	Screw	Water jet	Catamaran	Screw	Sail	Sail catamaran	
Pleasure	1	0	0	18	106	0	17	442	2	3	589
Commercial fishing	0	0	0	2	9	0	1	129	0	0	141
Passenger/fishing[1]	0	0	0	1	15	0	4	171	0	0	191
Passenger carrying	1	0	0	13	17	0	24	71	0	2	128
Miscellaneous	0	3	0	0	0	0	0	14	0	0	17
Freight only	1	28	0	0	0	0	0	4	0	0	33
Towing (tug)	0	0	0	0	0	0	1	28	0	0	29
Tanker	1	2	0	0	0	0	0	0	0	0	3
Passenger/fishing/ towing	0	0	0	0	0	0	0	1	0	0	1
Oil exploitation	0	0	0	0	0	0	0	1	0	0	1
Ocean research	0	0	0	0	0	0	0	1	0	0	1
Passenger/ocean research	0	0	0	0	0	0	0	1	0	0	1
Fishing/ocean research	0	0	0	0	0	0	0	1	0	0	1
Fishing/freight	0	0	0	0	1	0	0	2	0	0	3
Passenger/towing	0	0	0	0	0	0	0	4	0	0	4
Passenger/freight	1	0	0	0	0	0	0	0	0	0	1
Passenger/towing/ freight	0	0	0	0	0	0	0	1	0	0	1
Passenger/fishing/ freight	0	0	0	0	0	0	0	1	0	0	1
Total	5	33	0	34	148	0	47	872	2	5	1,146

[1]Includes charter.

Table 3b.--Frequency of Hawaii registered vessels for vessel usage by type of propulsion.

Usage	Not specified	Outboard	Inboard	Inboard-outboard	Sailing only	Sailing inboard	Sailing outboard	Manual	Other	Total
Pleasure	1	8,379	766	1,915	1,809	654	685	283	32	14,524
Commercial fishing	0	672	227	384	2	5	9	8	2	1,309
Passenger/fishing[1]	0	1	14	10	0	0	0	0	0	25
Passenger carrying	0	34	5	17	17	4	9	2	0	88
Other commercial	0	16	7	3	11	1	1	0	1	40
Livery	0	11	73	5	54	2	11	6	2	164
Dealer	34	6	4	0	3	0	0	0	0	47
Fee exemption/ youth group	0	5	2	1	33	0	2	0	1	44
Fee exemption/ government	0	129	22	17	100	1	0	3	6	278
Miscellaneous	0	41	5	2	5	4	2	8	2	69
Not specified	24	0	0	0	0	0	0	0	0	24
Total	59	9,294	1,125	2,354	2,034	671	719	310	46	16,612

[1]Includes charter.

Table 4.--Frequency count of documented and registered vessels in Hawaii by length (ft) of the vessel.

Length[1]	Registered	Documented	Total
Not specified	59	0	59
5	4	0	4
6	22	0	22
7	223	0	223
8	178	0	178
9	206	0	206
10	325	0	325
11	506	0	506
12	1,518	0	1,518
13	1,156	0	1,156
14	1,810	0	1,810
15	913	0	913
16	1,910	0	1,910
17	825	0	825
18	1,167	0	1,167
19	1,008	0	1,008
20	758	0	758
21	602	0	602
22	386	0	386
23	361	0	361
24	795	0	795
25	311	5	316
26	239	12	251
27	149	24	173
28	178	31	209
29	113	39	152
30	157	65	222
31	57	35	92
32	89	48	137
33	61	50	111
34	61	50	111
35	46	52	98
36	88	67	155
37	27	48	75
38	46	42	88
39	21	54	75
40	52	57	109
41	26	37	63
42	24	36	60
43	14	28	42
44	14	32	46
45	21	29	50
46	9	15	24
47	3	20	23
48	9	20	29

Table 4.--Continued.

Length[1]	Registered	Documented	Total
49	6	13	19
50	15	16	31
51	2	10	12
52	5	12	17
53	1	4	5
54	4	7	11
55	7	6	13
56	5	11	16
57	2	7	9
58	1	4	5
59	0	4	4
60	1	15	16
61	1	11	12
62	1	5	6
63	4	6	10
64	1	4	5
65	1	3	4
66	0	5	5
67	0	4	4
68	0	5	5
69	0	3	3
70	0	4	4
71	0	3	3
72	0	5	5
73	1	3	4
74	1	1	2
75	0	3	3
76	0	2	2
77	0	2	2
78	0	1	1
79	0	1	1
80	0	2	2
81	0	2	2
83	0	1	1
86	0	1	1
87	0	1	1
88	0	1	1
90	1	0	1
91	0	3	3
92	0	1	1
94	0	2	2
97	0	1	1
99	0	2	2
100	1	0	1
101	0	1	1
102	1	1	2

Table 4.--Continued.

Length[1]	Registered	Documented	Total
103	0	1	1
105	0	1	1
106	0	1	1
110	0	3	3
112	0	2	2
113	0	1	1
115	1	0	1
117	0	1	1
118	0	1	1
120	0	1	1
126	0	1	1
135	1	0	1
142	0	1	1
143	0	1	1
145	0	1	1
152	0	1	1
160	0	2	2
165	1	0	1
166	0	1	1
170	0	1	1
175	0	1	1
178	0	1	1
180	0	6	6
192	0	1	1
196	0	1	1
197	0	3	3
200	0	1	1
201	0	1	1
222	0	1	1
226	0	1	1
229	0	1	1
240	0	1	1
250	0	1	1
260	0	1	1
263	0	2	2
286	0	1	1
307	0	1	1
315	0	1	1
468	0	1	1
504	0	1	1
529	0	1	1
637	0	1	1
Total	16,612	1,146	17,758

[1]Recorded lengths of registered vessels were truncated to the nearest whole foot.

Table 5.--Frequency usage by length of vessels the combined documented registered vessels in Hawaii.

Usage	Not specified	<14 ft	14-15 ft	16-24 ft	25-30 ft	31-40 ft	41-60 ft	61-100 ft	101-150 ft	151-250 ft	>251 ft	Total
Not specified	24	0	0	0	0	0	0	0	0	0	0	24
Pleasure	0	3,793	2,594	6,633	1,009	750	315	18	1	0	0	15,113
Commercial fishing	0	55	50	932	213	121	50	26	1	2	0	1,450
Passenger/fishing[1]	0	0	0	7	46	103	57	3	0	0	0	216
Passenger carrying	0	2	12	52	26	53	34	30	5	1	1	216
Other commercial	0	16	3	13	3	2	2	0	1	0	0	40
Livery	0	88	24	41	10	0	1	0	0	0	0	164
Dealer	35	0	0	8	3	0	1	0	0	0	0	47
Fee exemption/ youth	0	29	6	4	2	3	0	0	0	0	0	44
Fee exemption/ government	0	127	28	98	7	10	5	1	1	1	0	278
Miscellaneous	0	28	6	24	4	4	13	2	3	2	0	86
Freight only	0	0	0	0	0	0	3	2	3	18	7	33
Towing (tug)	0	0	0	0	0	0	8	15	6	0	0	29
Tanker	0	0	0	0	0	0	0	0	0	2	1	3
Passenger/fishing/ towing	0	0	0	0	0	0	1	0	0	0	0	1
Oil exploitation	0	0	0	0	0	1	0	0	0	0	0	1
Ocean research	0	0	0	0	0	0	0	1	0	0	0	1
Passenger/ocean research	0	0	0	0	0	0	1	0	0	0	0	1
Fishing/ocean research	0	0	0	0	0	0	0	1	0	0	0	1
Fishing/freight	0	0	0	0	0	2	0	1	0	0	0	3
Passenger/towing	0	0	0	0	0	1	3	0	0	0	0	4
Passenger/freight	0	0	0	0	0	0	0	0	0	0	1	1
Passenger/towing freight	0	0	0	0	0	0	1	0	0	0	0	1
Passenger/fishing/ freight	0	0	0	0	0	1	0	0	0	0	0	1
Total	59	4,138	2,723	7,812	1,323	1,051	495	100	21	26	10	17,758

[1]Includes charter.

Table 6a.--Frequency of Hawaii registered vessels by "island" and usage category.

Usage	Not specified	Bougain-ville	California	Hawaii	Kauai	Lanai	Maui	Molokai	Niihau	Oahu	Spain	Tahiti	Total
Not specified	18	0	0	1	0	0	0	0	0	5	0	0	24
Pleasure	0	1	2	1,763	986	55	913	271	11	10,521	1	0	14,524
Commercial fishing	0	0	0	412	225	7	132	31	0	502	0	0	1,309
Passenger/ fishing[1]	0	0	0	8	5	0	7	2	0	3	0	0	25
Passenger carrying	0	0	0	11	20	1	32	1	0	23	0	0	88
Other commercial	0	0	0	2	2	0	14	0	0	22	0	0	40
Livery	0	0	0	9	15	2	35	0	0	103	0	0	164
Dealer	1	0	0	8	1	0	2	0	0	35	0	0	47
Fee exemption/ youth	0	0	0	1	0	0	0	0	0	43	0	0	44
Fee exemption/ government	0	0	0	13	8	0	4	1	0	251	0	1	278
her	0	0	0	7	1	2	10	0	0	49	0	0	69
Total	19	1	2	2,235	1,263	67	1,149	306	11	11,557	1	1	16,612

[1]Includes charter.

Table 6b.--Frequency of Hawaii documented vessels by island of residence of owner and usage category.

Usage	Other	Oahu	Kauai	Hawaii	Maui	Molokai	Lanai	Total
Pleasure	43	462	14	34	35	1	0	589
Commercial fishing	2	97	5	25	11	1	0	141
Passenger/fishing[1]	2	84	5	67	29	1	3	191
Passenger carrying	6	47	25	20	30	0	0	128
Miscellaneous	0	16	0	1	0	0	0	17
Freight only	1	30	2	0	0	0	0	33
Towing (tug)	3	24	1	1	0	0	0	29
Tanker	1	2	0	0	0	0	0	3
Passenger/fishing/ towing	0	0	0	1	0	0	0	1
Oil exploitation	0	1	0	0	0	0	0	1
Ocean research	0	1	0	0	0	0	0	1
Passenger/ocean research	0	0	0	1	0	0	0	1
Fishing/ocean research	0	1	0	0	0	0	0	1
Fishing/freight	0	0	0	2	1	0	0	3
Passenger/towing	0	4	0	0	0	0	0	4
Passenger/freight	1	0	0	0	0	0	0	1
Passenger/towing/ freight	0	1	0	0	0	0	0	1
Passenger/fishing/ freight	0	0	0	0	0	1	0	1
Total	59	770	52	152	106	4	3	1,146

[1]Includes charter.

Table 7.--Frequency of Hawaii registered vessels for type of vessel by usage category.

Usage	Not specified	Cabin motorboat	Open motorboat	Runabout	Sailboat with auxiliary power	Sailboat	Motor vessel (>65 ft)	Other	Total
Not specified	23	0	0	0	0	0	0	1	24
Pleasure	1	1,683	5,653	3,392	1,015	2,159	7	614	14,524
Commercial fishing	0	472	490	286	8	7	0	46	1,309
Passenger/fishing[1]	0	22	3	0	0	0	0	0	25
Passenger carrying	0	12	31	7	8	22	0	8	88
Other commercial	0	4	13	2	1	12	1	7	40
Livery	0	0	10	21	9	58	0	66	164
Dealer	33	1	6	1	0	3	0	3	47
Fee exemption/ youth	0	2	3	2	0	35	0	2	44
Fee exemption/ government	0	22	91		2	99	2	17	278
Miscellaneous	0	4	27	4	4	6	0	24	69
Total	57	2,222	6,327	3,760	1,047	2,401	10	788	16,612

[1]Includes charter.

Table 8.--Frequency of Hawaii registered vessels for type of vessel by type of propulsion.

Usage	Not specified	Outboard	Inboard	Inboard-outboard	Sailing only	Sailing inboard	Sailing outboard	Manual	Other	Total
Not specified	57	0	0	0	0	0	0	0	0	57
Cabin motorboat	1	347	640	1,230	0	0	1	2	1	2,222
Open motorboat	0	5,507	137	529	3	0	7	130	14	6,327
Runabout	0	2,989	165	556	0	0	3	43	4	3,760
Sailboat with auxiliary power	0	21	26	2	8	608	381	0	1	1,047
Sailboat	0	27	5	0	1,990	62	313	3	1	2,401
Motor vessel (>65 ft)	0	2	7	0	1	0	0	0	0	10
Other	1	401	145	37	32	1	14	132	25	788
Total	59	9,294	1,125	2,354	2,034	671	719	310	46	16,612

Table 9.--Frequency of Hawaii registered vessels for fuel type by vessel usage.

Usage	Not specified	Undefined code	Gasoline	Diesel	Other	Total
Not specified	18	6	0	0	0	24
Pleasure	1	1,377	11,478	819	849	14,524
Commercial fishing	0	8	1,095	197	9	1,309
Passenger/fishing[1]	0	0	16	9	0	25
Passenger carrying	0	11	62	6	9	88
Other commercial	0	11	22	7	0	40
Livery	0	42	104	0	18	164
Dealer	0	36	10	0	1	47
Fee exemption/ youth	0	18	9	1	16	44
Fee exemption/ government	0	59	148	20	51	278
Miscellaneous	0	5	48	7	9	69
Total	19	1,573	12,992	1,066	962	16,612

[1]Includes charter.

Table 10.--Frequency of Hawaii registered vessels for fuel type by type of propulsion.

Usage	Not specified	Outboard	Inboard	Inboard-outboard	Sailing only	Sailing inboard	Sailing outboard	Manual	Other	Total
Not specified	19	0	0	0	0	0	0	0	0	19
Undefined code	40	44	1	8	1,410	4	21	37	8	1,573
Gasoline	0	9,189	653	2,190	4	237	659	42	18	12,992
Diesel	0	7	471	155	0	430	3	0	0	1,066
Other	0	54	0	1	620	0	36	231	20	962
Total	59	9,294	1,125	2,354	2,034	671	719	310	46	16,612

Table 11.--Frequency of Hawaii registered vessels for usage by hull material.

Usage	Not specified	Wood	Steel	Fiber glass/ plastic	Alumi-num	Other	Rubber/ fabric	Total
Not specified	24	0	0	0	0	0	0	24
Pleasure	1	2,804	34	10,639	507	226	313	14,524
Commercial fishing	0	382	3	874	12	37	1	1,309
Passenger/fishing[1]	0	2	0	21	1	1	0	25
Passenger carrying	0	13	0	65	1	3	6	88
Other commercial	0	3	2	29	0	2	4	40
Livery	0	7	0	145	5	4	3	164
Dealer	33	0	1	12	0	0	1	47
Fee exemption/ youth	0	9	0	34	0	0	1	44
Fee exemption/ government	0	23	2	209	23	15	6	278
Miscellaneous	0	12	5	42	4	0	6	69
Total	58	3,255	47	12,070	553	288	341	16,612

[1]Includes charter.

Table 12.--Frequency of Northern Mariana Islands for vessel usage by type of propulsion.

Usage	Not specified	Outboard	Inboard	Inboard-outboard	Sailing only	Sailing inboard	Sailing outboard	Manual	Other	Total
Pleasure	0	1	0	0	0	0	0	0	0	1
Commercial fishing	0	4	0	0	0	0	0	0	0	4
Passenger carrying	0	2	0	0	0	0	0	0	0	2
Not specified	1	124	13	0	0	0	0	0	0	138
Total	1	131	13	0	0	0	0	0	0	145

Number	Length of field	Codes	Description
1	1	2=American Samoa	Country of registration
2-27	26		Owner's name
28-29	2	01-12, ⌀⌀	Month of birth
30-31	2	00-21, ⌀⌀	Day of birth
32-33	2	00-31, ⌀⌀	Year of birth
34-40	7		Citizenship
41-67	27		Owner's address
68-87	20		Hull serial number
88	1	1=Guam 2=American Samoa 5=California	State of principal use
89-97	9	Columns 89,90 AS=American Samoa Columns 96,97 AZ=Old numbers (all vessels) PU=Private use (pleasure) CF=Commercial fishing LR=Livery or rental CP=Carrying passengers for hire CU=Other commercial DA=Dealer XF=Government	Previous ("present") bow number
98-112	15		Make of boat
113-115	3		Length in feet
116-119	4		Year built
120	1	1=wood 2=steel 3=plastic/fiberglass 4=aluminum 5=other 6=rubber/fabric ⌀=none recorded	Hull material

Figure 1.--Format of the compu r tape cont ining the A erican Samoa vess inventory.

Column No.	Length of field	Codes	Description
121	1	1=outboard 2=inboard 3=inboard/outboard 4=sail only 5=sail & inboard 6=sail & outboard 7=manual 8=other Ø=none recorded	Propulsion
122	1	1=runabout 2=cruiser 3=house 4=sailing 5=other Ø=none recorded	Type of vessel
124-125	2	01=pleasure 02=commercial fishing 03=charter fishing 04=commercial passenger 05=other commercial 06=livery 07=dealer 08=manufacturer 09=youth group 10=government 11=other ØØ=none recorded	Use
126	1	1=original number 2=transfer of ownership 3=renewal of number 4=change in state of principal use Ø=none recorded	Reason for application
127-135	9	Columns 127, 128 AS=American Samoa See above ("previous bow number") for columns 134, 135	Present registration number
136-137	2	01-12	Month of expiration
138-139	2	76-84	Year of expiration
140-150	11		Name of vessel
151-160	10		-blanks-
161-164	4	2001-2155	SMS identification code

Figure 1.--Continued.

Column No.	Length of field	Codes	Description
1	1	1=Guam	Country of registration
2-27	26		Owner's name
28-29	2	01-12, ⌀⌀	Month of birth
30-31	2	00-31, ⌀⌀	Day of birth
32-33	2		Year of birth
34-40	2		Citizenship
41-67	27		Owner's address
68-87	20		Hull serial number
88	1	1=Guam	State of principal use
89-97	9	Columns 89-90 GM=Guam Columns 96-97 A⌀	Previous ("present") bow number
98-112	15		Make of boat
113-115	3		Length of vessel in feet
116-119	4		Year built
120	1	1=wood 2=steel 3=plastic/fiberglass 4=aluminum 5=other 6=rubber/fabric ⌀=none recorded	Hull material
121	1	1=outboard 2=inboard 3=inboard/outboard 4=sail only 5=sail & inboard 6=sail & outboard 7=manual 8=other ⌀=none recorded	Propulsion

Figure 2.--Format of the computer tape containing the Guam vessel inventory.

Guam

Column No.	Length of field	Codes	Description
122	1	1=runabout 2=cruiser 3-house 4=sailing 5=other Ø=none recorded	Type of vessel
123	1	1=gasoline 2=diesel 3=other Ø=none recorded	Fuel Type
124-125	2	01=pleasure 02=commercial fishing 03=charter fishing 04=commercial passenger 05=other commercial 06=livery 07=dealer 08=manufacturer 09=youth group 10=government 11=other ØØ=none recorded	Use
126	1	1=original number 2=transfer of ownership 3=renewal of number 4=change in state of principal use Ø=none recorded	Reason for application
127-135	9	Same as columns 89-97	Present registration number
136-137	2	01-12, ØØ	Month of expiration
138-139	2	76-84	Year of expiration
140-150	11		Name of vessel
151-160	10		-blanks-
161-164	4	1001-1706	SMS Identification code

Figure 2.--Continued.

Column No.	Length of field	Codes/Description
1-7	7	Vessel Number)) Boat registration number
8-9	2	Vessel Alpha)
10-36	27	Owner's name (Last name, first, mid initial)
37-63	27	Owner's address
64-65	2	Number of co-owners (00-99)
66-67	2	Month of expiration (01-12)
68-69	2	Year of expiration (01-82)
70	1	Type of registration 1 = new 2 = transfer of ownership
71-97	27	City and state
98-102	5	Zip code
103	1	Place kept (1=moored on water, 2=on land)
104-131	28	Island and/or harbor
132	1	Type of vessel 1 = cabin motorboat 2 = open motorboat 3 = runabout 4 = auxiliary powered sailing vessel 5 = sailing vessel 6 = motor vessel (more than 65 feet in length) 7 = other
133-136	4	Year built (1901-1981)
137-139	3	Length of vessel (feet: 001-999)
140-141	2	Length of vessel (inches)
142	1	Hull material 1 = wood 2 = steel 3 = fiberglass/plastic 4 = aluminum 5 = other 6 = rubber/fabric
143-162	20	Builder's serial number
163	1	Fuel type 1 = gasoline 2 = diesel 3 = other

Figure 3a.--Format of the computer tape containing the inventory of vessels registered by the Hawaii Department of Transportation.

Column No.	Length of field	Codes/Description
164	1	Propulsion 1 = outboard 2 = inboard 3 = inboard/outboard 4 = sail only 5 = sail & inboard 6 = sail & outboard 7 = manual 8 = other
165-166	1	Usage 01 = pleasure 02 = commercial fishing 03 = charter fishing 04 = commercial passenger 05 = other commercial 06 = livery 07 = dealer 08 = manufacturer 09 = fee exempt youth group 10 = fee exempt government 11 = other
167	1	New code*
168	1	-blank-
169-244		blanks, documented vessel information
245-248	4	-blank-

* Not identified on information provided by Coast Guard. Blank for most records.

Figure 3a.--Continued.

Column No.	Length of field	Codes/Description
1-7	7	vessel number
8-9	2	blank
10-36	27	Owner's name(last, first, middle initial)
37-63	27	Owner's address
64-70	7	blank
71-97	27	City and state of residence (sometimes city & count
98-102	5	Zip code
103-132	30	blanks
133-136	4	Year built
137-139	3	Length of vessel (feet)
140-141	2	Length of vessel (tenths of a foot)
142-164	23	blanks
165-166	2	Usage, "service" 01=pleasure 02=commercial fishing 03=passenger & fishing (charter) 04=passenger carrying 05=other commercial 06=livery 07=dealer 08=manufacturer 09=fee exempt youth group 10=fee exempt government 11=miscellaneous 12=freight only (e.g. barge) 13=towing (tug) 14=dredging 15=tanker 16=passenger, fishing, towing 17=oil exploitation 18=ocean research 19=passenger / ocean research 20=fishing and ocean research 21=fishing and freight 22=passenger and towing 23=passenger and freight 24=passenger, towing & freight 25=passenger, fishing & freight

Figure 3b.--Format of the computer tape containing the inventory of vessels documented in Hawaii by the U.S. Coast Guard.

Documented Vessels - Hawaii

Column No.	Length of field	Codes/Description
167-168	2	blanks
169-186	18	Name of vessel
187-194	8	Rig Brg = barge Drg. = dredge Ga.Ct. = gas catamaran Ga.s. = gas screw Jtg = gas water jet Ol.Ct. = oil catamaran Ol.s. = oil screw Sail = sail Sail.Ct. = sail catamaran
195-198	4	Gross tonnage
199-202	4	Net tonnage
203-204	2	Breadth of vessel (feet)
205-206	2	Breadth of vessel (tenths of a foot)
207-208	2	Depth of vessel (feet)
209-210	2	Depth of vessel (tenths of a foot)
211-214	4	Horsepower
215-244	30	City and state (or country) where built
245-248	4	SMS Identification number (0001-1142)

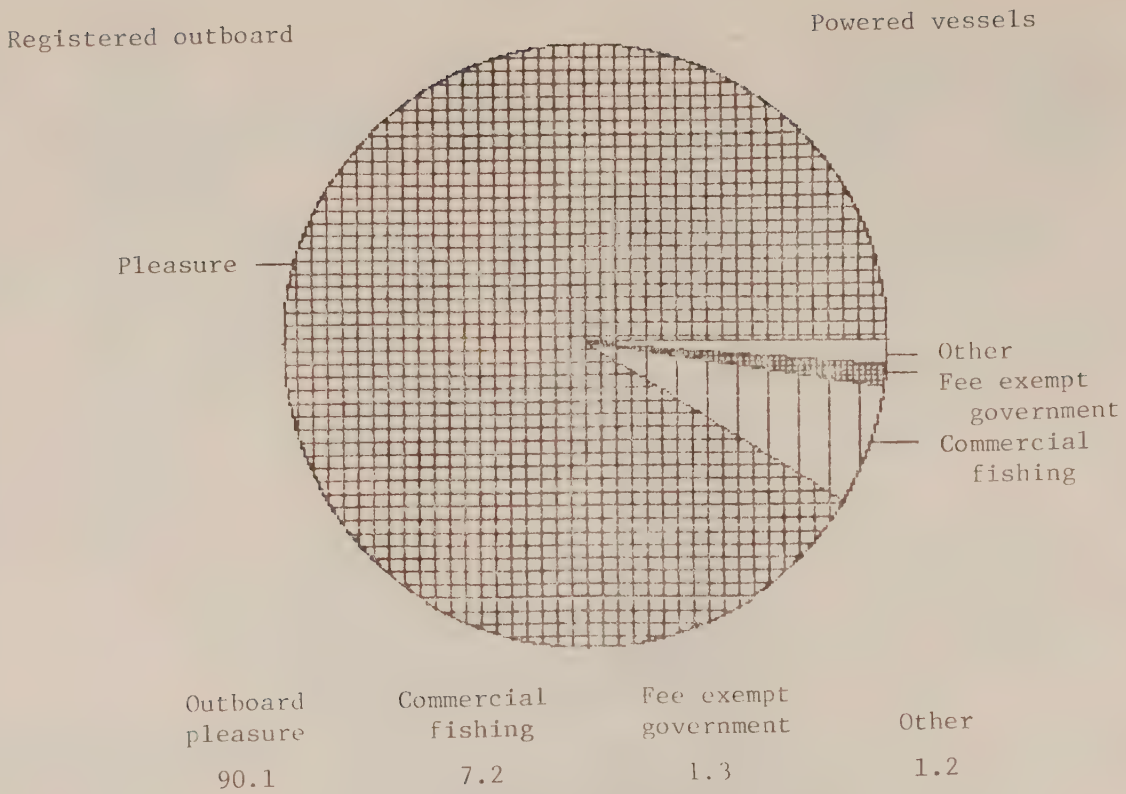
Figure 3b.--Continued.

Column No.	Length of field	Codes	Description
1	1	3-Northern Marianas	Country of registration
2-27	26		Owner's name
28-29	2	01-12, ØØ	Month of birth
30-31	2	00-31, ØØ	Day of birth
32-33	2		Year of birth
34-40	7		Citizenship
41-67	27		Address
68-87	20		Hull serial number
88	1	3=Northern Marianas	State of principal use
89-97	9	No boats were previously registered	
98-112	15		Make of boat
113-115	3		Length in feet
116-119	4		Year built
120	1	1=wood 2=steel 3-plastic/fiberglass 4=aluminum 5-other 6=rubber/fabric Ø=none recorded	Hull material
121	1	1=outboard 2-inboard 3=inboard/outboard 4=sail only 5=sail & inboard 6=sail & outboard 7=manual 8=other Ø=none recorded	Propulsion
122	1	1=runabout 2=cruiser 3=house 4=sailing 5=other Ø=none recorded	Type of vessel

Figure 4.--Format of the computer tape containing the Northern Mariana Islands vessel inventory

Column No.	Length of field	Codes	Description
123	1	1=gasoline 2=diesel 3=other Ø=none recorded	Fuel type
124-125	2	01=pleasure 02-commercial fishing 03=charter fishing 04=commercial passenger 05=other commercial 06=livery 07=dealer 08=manufacturer 09=youth group 10=government 11=other ØØ=none recorded	Use
126	1	1=original 2=transfer of ownership 3=renewal of number 4=change in state of principal use Ø=none recorded	Reason for application
127-135	9	No registration number recorded	Resent registration Number
136-137	2	01-12 numeric	Month of expiration
138-139	2	76-84 numeric	Year of expiration
140-150	11	alpha	Name of vessel
151-152	2	Width of vessel (feet)	
153	1	Depth of vessel	
154-156	3	Cumulative horsepower	
157	1	Number of engines	
158-160	3	Fuel capacity	
161-164	4	SMS Identification code	

Figure 4.--Continued.



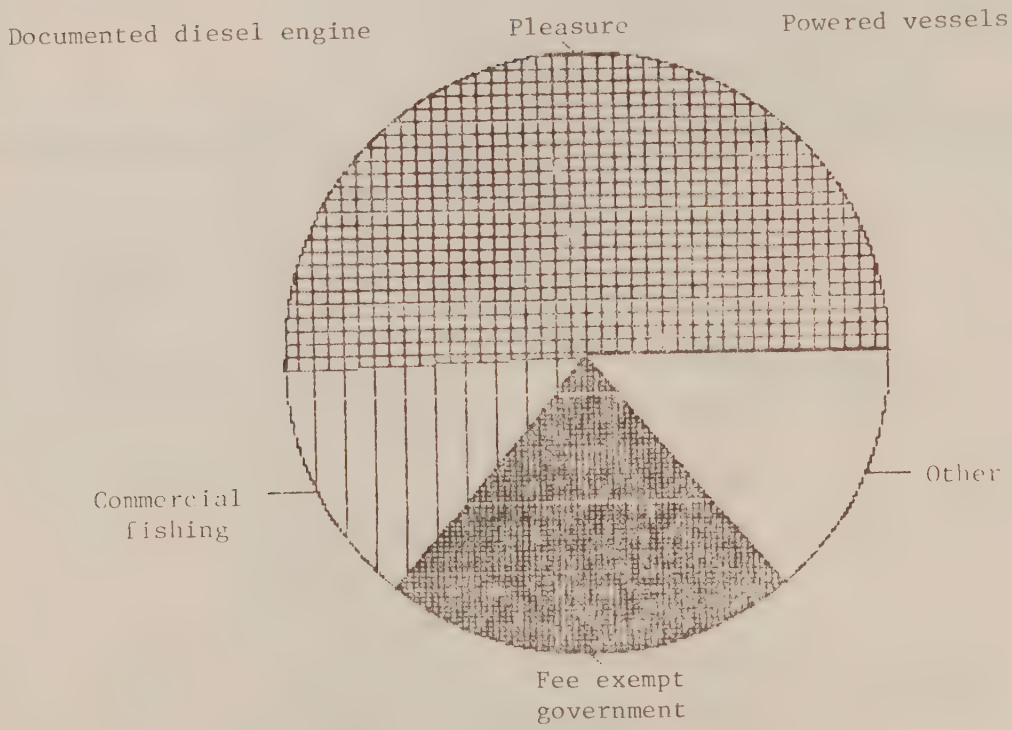
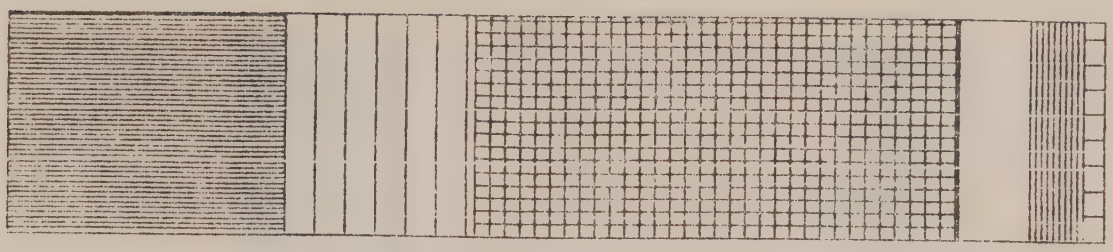


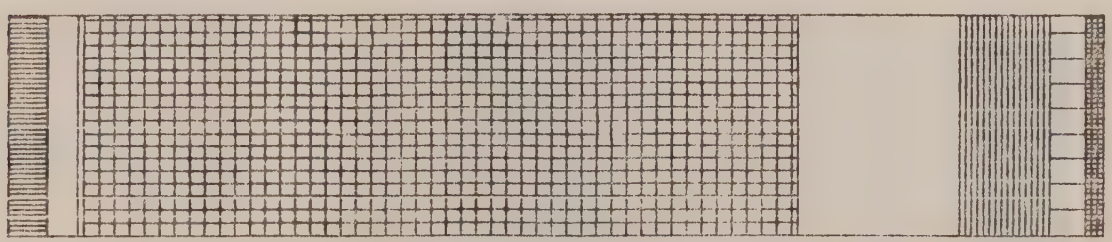
Figure 5.--Percent composition of registered outboard powered vessels and documented diesel engine powered vessels by usage categories in Hawaii.

Pleasure



<14 ft	14-<16	16-24	25-30	31-40	41-60	61-100	101+ft
25.0	17.1	43.8	6.6	4.9	2.0	0.1	0.0

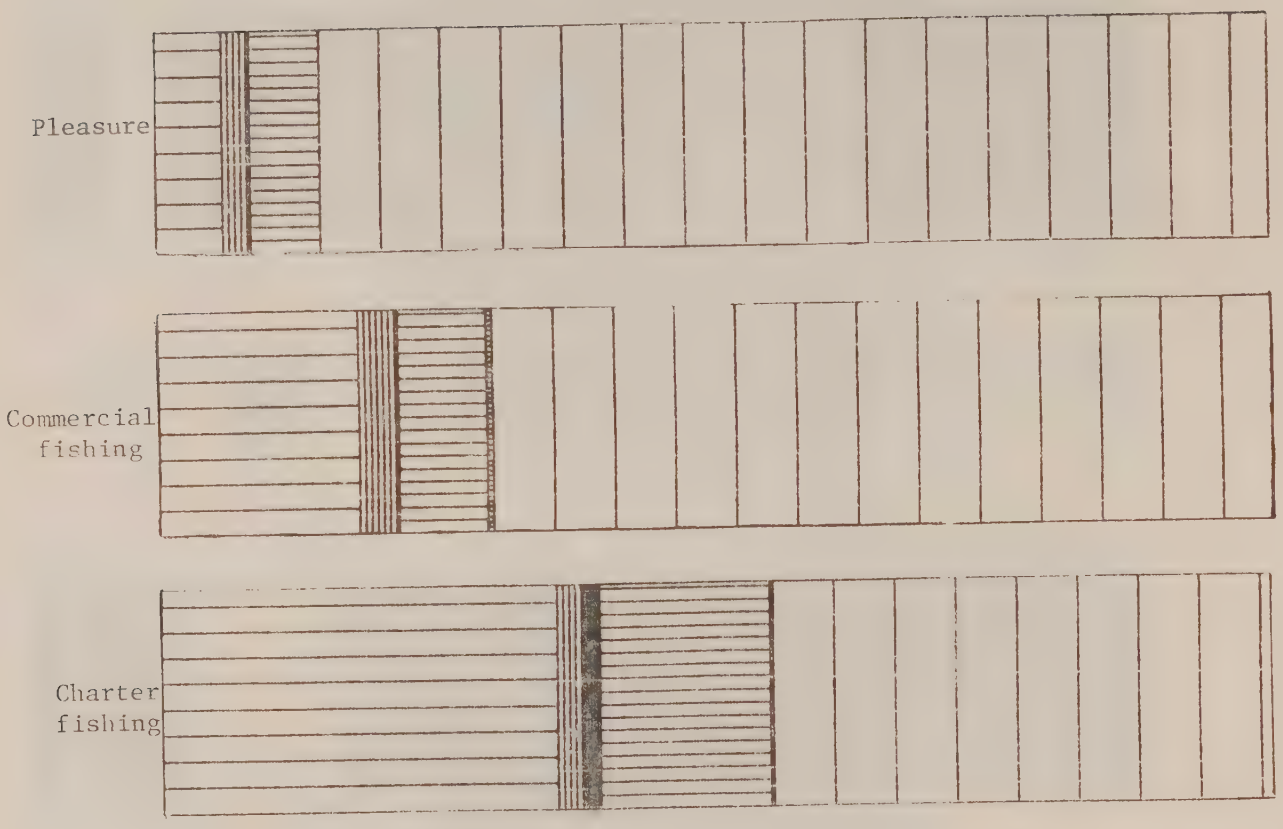
Commercial fishing



<14 ft	14-<16	16-24	25-30	31-40	41-60	61-100	101+ft
3.7	3.4	64.2	14.6	8.3	3.4	1.7	0.2

Figure 6.--Percent occurrence of pleasure and commercial fishing usages by length intervals for documented and combined vessels in Hawaii.

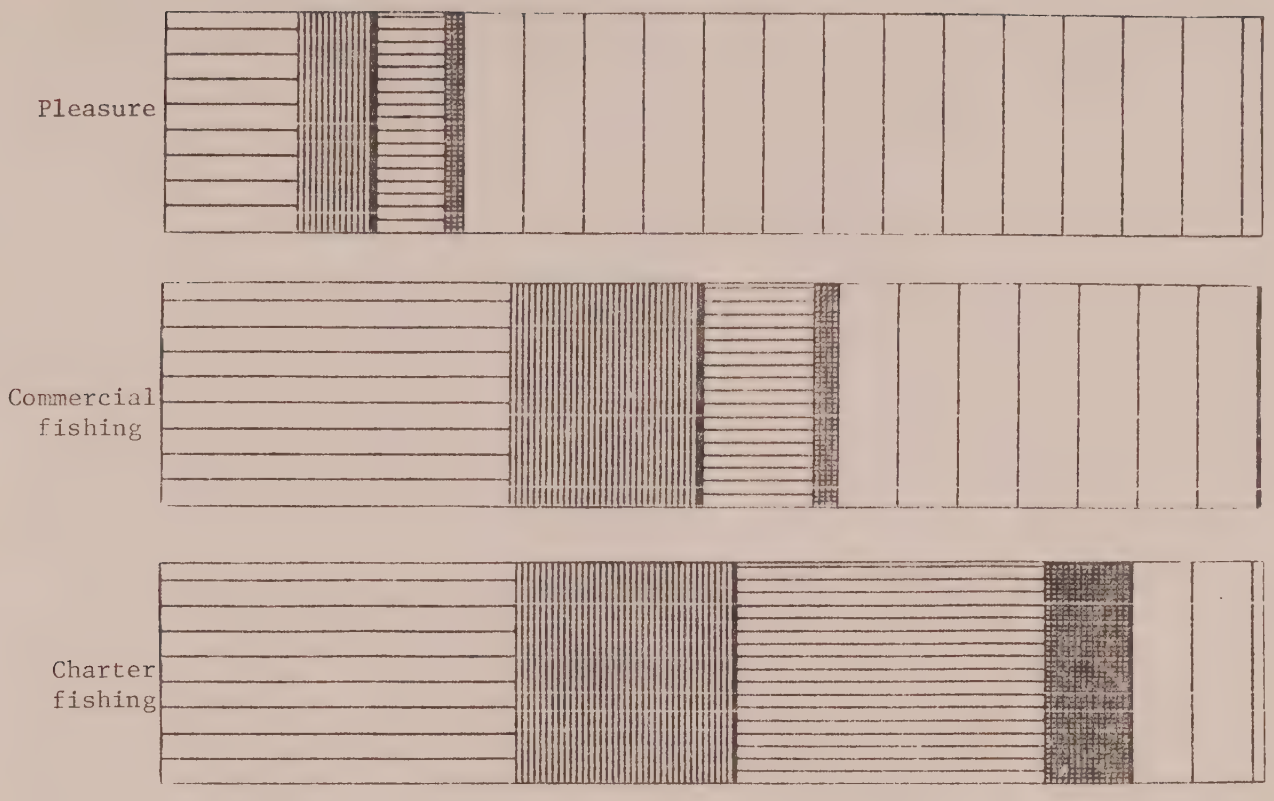
Documented Hawaii boats
percentage by island



	Hawaii	Kauai/Niihau	Lanai	Maui	Molokai	Oahu
Pleasure	6.2	2.5	0.0	6.4	0.1	84.6
Commercial fishing	17.9	3.5	0.0	7.9	0.7	69.7
Charter fishing	35.4	2.6	1.5	15.3	0.5	44.4

Figure 7.--Continued.

Registered Hawaii boats
percentage by island



	Hawaii	Kauai/Niihau	Lanai	Maui	Molokai	Oahu
Pleasure	12.1	6.8	0.3	6.2	1.8	72.4
Commercial fishing	31.4	17.1	0.5	10.0	2.3	38.3
Charter fishing	32.0	20.0	0.0	28.0	8.0	12.0

Figure 7.--Percent of pleasure, commercial fishing, and charter boat usages by island for documented and registered boats in Hawaii.

H-84-9

SOUTHWEST FISHERIES CENTER
HONOLULU LABORATORY
P.O. BOX 3830
HONOLULU, HI 96812
NATIONAL MARINE FISHERIES SERVICE

JULY 1984

LIBRARY
National Service
2570 Dole Street
Honolulu, Hawaii

TRENDS IN THE MARKET FOR MAHIMAHI AND ONO IN HAWAII

BROOKS TAKENAKA and LEONARD TORRICER
B. T. & Associates
Honolulu, Hawaii 96813

JAMES C. COOPER and SAMUEL G. POOLEY
Southwest Fisheries Center Honolulu Laboratory
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96812

Not for Publication

ADMINISTRATIVE REPORT H-84-9

Southwest Fisheries Center Administrative Report H-84-9

TRENDS IN THE MARKET FOR MAHIMAHI AND ONO IN HAWAII

Brooks Takenaka
Leonard Torricer
B.T. & Associates
Honolulu, Hawaii 96813

James C. Cooper and Samuel G. Pooley
Southwest Fisheries Center Honolulu Laboratory
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96812

July 1984

[NOT FOR PUBLICATION]

INTRODUCTION

While fishery development activities in the Northwestern Hawaiian Islands and a return to modernized traditional handline methods in the main islands have been widely heralded in Hawaii, a quiet explosion has occurred in the fresh mahimahi (dolphin), Coryphaena hippurus, and ono (wahoo), Acanthocybium solandri, markets. Mahimahi has long been considered the "State fish" in the tourism sector, but most of which that appeared on visitor plates was a frozen product imported from Taiwan, Ecuador, or Peru. Local production of both species was low in the 1960's. However, in 1973, catches and prices of both species began to rise dramatically to the point where fresh mahimahi or ono dinner entrees now frequently go for over $14.00 in local restaurants, and the selection in supermarkets and retail fish shops has become severely limited because of strong restaurant demand.

Recognizing the unique aspects of this situation, the Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, sponsored a study in 1982 of marketing changes for these two white-flesh pelagic fishes. The study was undertaken by B.T. & Associates, a firm closely associated with the Honolulu fresh-fish auction and Hawaii's other seafood markets. Their study was issued in 1983 as Southwest Fisheries Center Administrative Report H-83-6C. Takenaka, principal investigator, and Torricer provided the marketing text, and Cooper and Pooley provided statewide landings results for this report.

Other information on mahimahi and ono is extremely limited and only two informal marketing reports have been written in Hawaii.[1,2]

History

Mahimahi and ono are frequently caught by longline vessels and domestic trollers. Relative to other locally-caught species, fresh mahimahi has been a fairly high priced item in Honolulu restaurants since the 1960s. A Honolulu family restaurant located away from the heart of Waikiki, was long noted for its fresh mahimahi, but their supply of fish was uneven and inconsistent. Frozen mahimahi frequently appeared as "fresh" mahimahi at restaurants which catered to tourists, whereas the local market emphasized red-flesh fish such as skipjack tuna, Katsuwonus pelamis, and yellowfin tuna, Thunnus albacares. Ono was seldom served in restaurants before the mid-1970's.

---

[1]Char, R. 1978. Mahimahi imports, exports and consumption in the State of Hawaii. Prepared for Western Pacific Regional Fishery Mangement Council, 10 p.

[2]Evering, G. C. 1980. The supply of Coryphaena hippurus in the State of Hawaii. Department of Agricultural Economics, University of Hawaii, 18 p. (Unpublished paper.)

In 1970, commercial landings of mahimahi in Hawaii were only 75,000 pounds while ono landings were 45,000 pounds (Tables 1 and 2). This contrasted with earlier periods in which the combined landings of both species were 300,000 pounds (1950). By 1979 mahimahi landings had risen to 165,000 pounds and ono landings to 200,000 pounds exceeding the post-war peak. Meanwhile, the average ex-vessel price of mahimahi had risen from $0.72 per pound in 1970 to as much as in 1979, despite the large increase in supply. The inflation-adjusted average price has increased 29% over the decade. The average ex-vessel price of ono has increased from $0.27 a pound in 1970 to $1.53 in 1979 (rising 200% in inflation-adjusted average prices). The combined revenue of locally-caught fresh mahimahi and ono increased tenfold in real terms (inflation-adjusted) over the last decade, and the statewide reported sales were $587,000 in 1979.

At the Honolulu auction, where premium prices are awarded to high quality fresh fish, the number of fish going through the auction has increased dramatically, from 4,500 in 1975 to 15,300 in 1981. Total value rose from $151,000 to $690,000 during the same period (Tables 3 and 4). The auction price per pound of fresh mahimahi exceeds $5.00 in months of low availability.

The availability of mahimahi in Hawaiian waters is distinctly seasonal with peaks in abundance during the spring (March and April) and the fall (October and November) (Fig. 1). The small boat operations which characterize Hawaii's commercial fishery in the main islands are sustained by a diversity of fish resources. Fishing effort is applied to those species considered most abundant, and considerably less effort is applied in the off-season. The smallest number of fresh mahimahi pieces is sold in the winter months, usually December or January, when waters are rough and when demand for bottom fish and ahi (yellowfin tuna, T. albacares, and bigeye tuna, T. obesus) reaches its peak.

The seasonality of fresh mahimahi is confirmed by an analysis of Hawaii Division of Aquatic Resources (HDAR) monthly landings records (Fig. 1). An autoregressive, interative moving average (ARIMA) program using the Box-Jenkins method of identifying cyclical patterns in periodic data was applied to statewide landings. This program looks for and identifies regular cycles in data in which such characteristics may not be apparent. Results of the identification phase of ARIMA on the weekly weight landed, revenue and average price for the period 1976-80 are shown in Figures 2-4. The figures show the correlation of a current weeks value with each of 64 previous weeks. All three series show undamped cyclical behavior and lags of 26-28 and 52 weeks. The price variable shows a significant peak at lag 28 which indicates that the price of mahimahi in any 1 week is positively correlated ($r = 0.193$) with the price of mahimahi 28 weeks (6 months) earlier. The revenue and weight sold variables show significant peaks at 26 weeks ($r = 0.389$ and 0.358, respectively). This periodicity confirms a definite semiannual seasonality falling within the April and October range identified by the auction data. The 52-week lag corresponds to year-to-year influences on availability and price, as would be expected (positive correlations of 0.308, 0.239, and 0.278, respectively).

Although mahimahi can bring $4.50-$5.00 per pound to the vessel during the off-season, more important for the long-term income of fishermen is the base price level. In 1981 the lowest average monthly price was $1.94, considerably above previous lows. The United Fishing Agency data indicate that the quantity demanded for fresh mahimahi, as measured by total weight sold, has increased by 128% since 1975. Harvesting of this species continues to be more attractive each year, and even with rising prices, wholesale dealers demand is high.

Like mahimahi, the availability of ono is also seasonal and most are landed during the summer months (Fig. 5). Little of either is available in January or February while in the other months their different seasonality patterns partially balance supply.

A 1979 wholesale market survey by the National Marine Fisheries Service showed that 42 firms handled fresh and frozen mahimahi (worth $10.6 million in 1979) and 23 firms handled ono.[3] Wholesale revenue was $10.6 million for mahimahi (fresh and frozen) and $1.3 million for ono. Both species are sold throughout the retail sector. A 1982 survey of supermarkets, restaurants, and institutional markets provided an estimate of $16 million sales of mahimahi (8.7 million pounds) and $3.7 million of ono (1.2 million pounds) in Hawaii. (Unpublished data, NMFS.)

THE MARKET

Four factors have been identified with the increasing demand for fresh mahimahi and ono in Hawaii, some of which are local in scale and some of which are nationwide trends. These include:

* A general increase in overall seafood consumption due to health considerations.
* A growing population in Hawaii of people with preferences for white-flesh fish.
* The popularity of the "Hawaii" label in mainland U.S. markets.
* Convenient preparation.

Health

The advantages of eating fish over red meats have been widely recorded may have increased the acceptance of fish as a restaurant meal. In the area of health, seafood consumption has risen dramatically in the past 10 years, favoring fresh and frozen seafood products.

---

[3]Cooper, J. C., and S. G. Pooley. 1982. Total seafood volume in Hawaii's wholesale fish markets. Southwest Fish. Cent. Honolulu Lab., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96812, Admin. Rep. H-82-15, 12 p.

Demography

There seems to be a cultural correlation between the ethnic groups which reside in Hawaii and their preference for fish. Many Asian, Hawaiian, and other non-Caucasian groups have always had a definite preference for red-fleshed fish whereas Caucasians prefer white-fleshed fish. The ethnic composition of Hawaii's seafood eating population began to change dramatically in 1970, especially through the growth of up-scale seafood restaurants catering to tourists (of whom there were 4 million in 1982).

Familiarity

Awareness of mahimahi and its seasonal availability caused a greater demand for the species. Primarily as a result of the competitive nature of the restaurant business, fresh mahimahi became established as a menu item among the exclusive restaurants in Honolulu. Tourists and new residents were introduced to other species of white-fleshed fish through their initial experience with fresh mahimahi, supplies of which continued to be inconsistent or seasonal. More people began to prefer and request fresh fish, more restaurants began serving fresh seafood, restaurant chefs learned how to prepare mahimahi according to the taste preferences of tourists, and the fish wholesale and distribution network expanded to provide the fresh product.

Tourism

The primary market for fresh mahimahi in Hawaii remains Honolulu, the population and tourist center. The development of Maui as a tourist center (over 1 million tourists annually) has created a large secondary market for fresh mahimahi and has created new conditions for commercial fisheries development on that island.

The "Hawaii" Label

Exports of mahimahi and ono to the U.S. mainland have just begun, riding the acceptance of the "Hawaii" label in mainland markets. Visitors to Hawaii and military personnel returning home advise others about fresh mahimahi. Television and printed media advertising promote the Hawaii label, and a variety of products are increasingly marketed as "made in Hawaii." These circumstances have made possible high-priced export markets for fresh mahimahi, as well as for other white-fleshed fish (such as ono and opakapaka, Pristipomoides filamentosus). The ability to export to the mainland U.S. market has assisted the Hawaii commercial fishery by maintaining demand during periods of seasonal abundance (April and October), so that gluts do not greatly depress prices in the local fish market.

Preparation

The marketing and processing capabilities of the Hawaii seafood industry have expanded significantly since 1975. Fresh mahimahi is

routinely filleted by wholesale dealers for sale to restaurants. The boneless fillets are a highly convenient product for use by restaurant chefs. The chefs need only cut individual meal sized (6 oz) portions of fish from the fillets, and this savings in labor is an important economic advantage for the restaurants. Although the yield of saleable product from mahimahi is similar to that from opakapaka and other species used in restaurants, the body shape and average size of individual fish make it somewhat easier to prepare.

The shelf life of freshly caught mahimahi is 5 to 7 days, and most restaurants usually maintain an inventory of mahimahi, which is frozen for short periods. In placing orders with wholesalers, restaurant purchasing agents have to balance their previous investment in inventory against current availability and price. A restaurant having little inventory may have to pay higher than average prices to assure availability of fresh mahimahi. The variability in supply and price, coupled with steady demand, causes the price and also the profit margin of a fresh mahimahi dinner at a Waikiki restaurant to fluctuate considerably throughout the year. Restaurants can list frozen mahimahi dinners on their menus at a fixed price but usually sell fresh mahimahi dinners at a fluctuating price.

Fresh Ono

The gap in total landings and revenues which existed between fresh mahimahi and fresh ono as recently as 1975 is closing rapidly (Table 1-4). The explanation for the sharp rise in the demand and price for ono is that this species has been perceived as a close equivalent to mahimahi by the restaurants which serve fresh white-fleshed fish and has found market acceptance. Since it is not possible for restaurants to offer fresh mahimahi throughout the year, chefs have looked to other white-fleshed fish as substitutes. However, unlike mahimahi, the other species are generally not available in frozen form as a backup to the fresh product. Therefore, ono, opakapaka, ulua (Carangidae), swordfish, Xiphias gladius, and other species which complement or substitute for the more popular mahimahi are generally served as "fish of the day" or as specials. The price of a fresh ono dinner at one popular restaurant has increased from $7.50 to $12.00 over the past 4 years.

All of the white-meat species upon which restaurants rely are subject to seasonal variation in availability, so it is necessary for chefs to rely on the full array of available products. Their purchases are based on the affordability, as well as the availability, of the preferred species. Because the seasonal abundance of fresh mahimahi and ono in Hawaiian waters does not overlap, there is only limited market competition between the species.

Frozen Imports

Noting the rising demand for the "State fish" but the lack of a consistent supply, one or two Honolulu wholesalers in 1970-71 began to make speculative purchases of frozen mahimahi in Japan for import to

Hawaii. Mahimahi is not a popular fish in Japan or Taiwan, but it is caught in large quantitites by those nations' distant-water tuna longline fleets. Through bulk purchasing, the Honolulu buyers were able to obtain low prices and uniformity of the frozen product in filleted form.

The availability of a consistent supply of frozen fillets made it possible for exclusive restaurants to back up the limited fresh fish supply and to place mahimahi on the menus with assurance. The low cost of the frozen imported product gave fast-food and general public restaurants the opportunity to serve mahimahi as a low budget menu item. The only way to provide every tourist with the experience of eating the best known fish in Hawaii is through frozen fillets. Char's report noted that a large hotel chain purchased 240,000 pounds of frozen mahimahi and another hotel chain 80,000 pounds in 1977. Although frozen fillets are sold through retail markets, they are most widely used by the large number of restaurants which serve the general public, rather than an exclusive clientele.

Evering (see footnote 2) estimates that imports of frozen mahimahi fillets rose to 6 million pounds in 1980, compared with an average of 2.6 million pounds per year before 1975. These estimates are based on the amount of undifferentiated frozen fish fillets imported from Japan and Taiwan as reported by the U.S. Customs Service. Mahimahi is not separately recorded but quantities can be inferred by a process of elimination. Taiwan supplies most of the imports. Smaller quantities are shipped from Japan, and some mahimahi fillets originate in Latin America. During the summer months, Hawaii distributors rely on large amounts of frozen fillets imported from Taiwan and Japan. Frozen fillets from Latin America augment the reduced supply from Asian nations during the winter. However, Taiwan mahimahi is considered to have better quality than that from other sources and is thus preferred. The declared value of frozen mahimahi imports from Taiwan and Japan averaged $0.76 per pound in 1980, compared to an average sales price of $2.41 per pound (round weight) for fresh mahimahi sold through the fish auction.

Frozen mahimahi is becoming a more expensive source of protein because of the extra cost of meeting quality standards. Nevertheless, demand does not appear to be slackening for this product. Furthermore, because of the major differences in the price for fresh and frozen mahimahi (perhaps a sixfold magnitude for equivalent servings), the fast-food and general public restaurants which are the major buyers of the frozen fillets are not generally able to substitute fresh mahimahi if their frozen supply is interrupted.

Mahimahi is shipped to Hawaii as frozen, skin-on, boneless, trimmed fillets, which are often graded and priced by weight gradations. In the initial years of import, wholesalers could purchase the frozen fillets for about $0.30 per pound, but in recent years, the price has been $0.75-$0.80 per pound. Retailers pay about $1.00-$1.20 per pound. In recent years, seven major wholesalers and a good number of smaller wholesalers have been involved in importing mahimahi from Taiwan. A standard order from one wholesaler is one container (30,000 pounds) per month. Most wholesale

dealers use a broker who combines orders. The Taiwan fillets are distributed directly to retailers, whereas the fillets from Latin America arrive in larger lots (250,000 pounds) and are frequently held in storage and withdrawn when supply is short.

In April 1979, a case of histamine poisoning in Hawaii was attributed to mahimahi imported from Taiwan. The U.S. Food and Drug Administration (FDA) delayed the sale of approximately 25% of incoming shipments of frozen mahimahi until tests were made. Histamines are difficult to detect because their presence is far from uniform in batches of fish. The risk of histamine poisoning is reportedly greatly increased by poor handling of mahimahi by exporters. In the summer and fall of 1980, there were several more incidents of histamine poisoning, and every container of frozen fillets was blocklisted by the FDA. This means that all shipments into the U.S. are now detained until the importer can prove that the shipment conforms to required sanitary standards by means of independent laboratory analysis.

There is no discrimination in FDA testing of mahimahi fillets from various origins. Although the testing of samples is usually completed within a few days after seizure, the FDA may take several months to review the laboratory results before allowing release of the frozen fish for sale. Not only are distributors' initial costs for fish purchases tied up, but storage fees are incurred during the delays. The cost of the delay, plus the loss of several lots of the product rejected by the FDA, caused many dealers to stop handling imported mahimahi. There was a reduction in imports from Taiwan and Japan in 1980, possibly caused by the confusion in the market. The reduction forced some buyers to accept New Zealand snapper fillets as a substitute for mahimahi in the spring of 1981.

Frozen ono is not widely available in world landings so no import system has developed in Hawaii. Ono is sometimes brought from India and other parts of Asia as frozen steaks or fillets, but a steady supply is not available. Ono is also landed and canned in American Samoa where it is considered a local delicacy.

CONCLUSION

The rising demand for locally caught, fresh mahimahi is a result of its acceptance among the Caucasian tourist and resident populations of Hawaii, and the strong association of this species with the "Hawaii" label. The shift toward greater seafood consumption among a health-conscious American population has contributed to greater awareness and preference for fresh seafoods in general.

Fresh and frozen products have unique markets. The great demand in restaurants for fresh mahimahi has caused the price to rise, stimulating an increase in fishing effort for this species. The bulk of the fast-food and general public restaurants in Hawaii cannot afford to put high-priced fresh mahimahi on their menus, but large imports of frozen mahimahi fillets have made low-budget meals feasible for such establishments. Independent seafood markets cannot do without either product.

Fresh ono is rapidly gaining the same market acceptance and status as fresh mahimahi in the restaurants which serve white-meat fish to tourists. The supply of fresh ono may not be as limited as that of fresh mahimahi, but the price of both is expected to continue climbing as long as the tourist experience in Hawaii includes a fresh-fish dinner. In fact, market opportunities may exist for other white-meat species if they could gain market recognition and acceptance comparable to mahimahi and ono.

Competition may arise from imports of other white-meat fish, such as California rockfish (Scorpaenidae). At the same time, a decline in the demand for fresh mahimahi due to a decline in Hawaii's tourism industry would have major repercussions on the market situation. Therefore, although the local mahimahi and ono fisheries have been rejuvenated over the past 5 years, the situation is not necessarily sanguine.

Table 1.--Mahimahi annual landings statewide.

YEAR	CATCH IN THOUSANDS OF POUNDS	CATCH IN METRIC TONS	REVENUE IN THOUSANDS OF DOLLARS	DEFLATED REVENUE IN THOUSANDS OF DOLLARS	ADJUSTED REVENUE IN THOUSANDS OF DOLLARS
1949	170.7	77.4	58.29	83.63	212.26
1950	276.1	125.2	81.70	122.13	309.96
1951	211.4	95.9	69.51	97.90	248.47
1952	187.1	84.9	70.04	95.82	243.19
1953	162.6	73.7	66.73	90.54	229.79
1954	235.8	106.9	77.23	103.81	263.47
1955	265.5	120.4	85.66	113.60	288.33
1956	183.6	83.2	68.43	89.57	227.33
1957	209.8	95.2	72.00	91.14	231.31
1958	149.0	67.6	57.83	69.85	177.28
1959	108.7	49.3	49.12	58.33	148.05
1960	90.6	41.1	50.17	58.13	147.53
1961	116.4	52.8	47.75	53.90	136.79
1962	109.0	49.4	46.63	51.46	130.61
1963	127.2	57.7	52.00	56.16	142.53
1964	85.4	38.7	46.56	50.12	127.20
1965	91.3	41.4	48.05	50.79	128.92
1966	85.4	38.7	41.36	42.51	107.88
1967	72.1	32.7	42.07	42.07	106.78
1968	73.5	33.4	49.29	47.49	120.53
1969	58.5	26.5	53.70	49.49	125.60
1970	76.1	34.5	54.82	48.00	121.83
1971	114.8	52.1	73.77	62.05	157.47
1972	175.2	79.5	115.01	93.65	237.69
1973	114.4	51.9	94.29	73.50	186.53
1974	111.4	50.5	108.27	76.30	193.64
1975	117.5	53.3	115.19	74.32	188.62
1976	139.1	63.1	178.40	109.58	278.12
1977	150.3	68.2	223.80	130.27	330.62
1978	130.8	59.3	217.45	117.67	298.64
AVERAGE	140.0	63.5	80.50	76.79	194.90

Table 2.--Ono annual landings statewide.

YEAR	CATCH IN THOUSANDS OF POUNDS	CATCH IN METRIC TONS	REVENUE IN THOUSANDS OF DOLLARS	DEFLATED REVENUE IN THOUSANDS OF DOLLARS	ADJUSTED REVENUE IN THOUSANDS OF DOLLARS
1949	49.0	22.2	15.98	22.93	58.19
1950	48.6	22.0	10.58	15.82	40.15
1951	38.8	17.6	10.48	14.75	37.45
1952	49.1	22.2	11.74	16.06	40.76
1953	50.8	23.0	11.17	15.15	38.46
1954	34.8	15.8	7.20	9.68	24.56
1955	38.8	17.6	8.13	10.79	27.37
1956	30.2	13.7	7.42	9.71	24.66
1957	31.3	14.2	7.23	9.15	23.22
1958	39.2	17.8	7.68	9.28	23.55
1959	30.1	13.7	6.40	7.60	19.28
1960	23.9	10.8	5.72	6.63	16.83
1961	25.4	11.5	5.07	5.72	14.53
1962	24.4	11.0	4.60	5.08	12.90
1963	29.8	13.5	5.47	5.91	15.00
1964	33.1	15.0	6.43	6.92	17.57
1965	31.0	14.1	6.09	6.43	16.33
1966	22.3	10.1	4.94	5.08	12.89
1967	39.2	17.8	8.60	8.60	21.82
1968	28.2	12.8	6.64	6.39	16.23
1969	35.2	15.9	9.27	8.54	21.68
1970	44.4	20.1	12.13	10.62	26.95
1971	39.2	17.8	12.02	10.11	25.67
1972	52.9	24.0	17.51	14.26	36.20
1973	75.7	34.4	30.91	24.09	61.15
1974	72.6	32.9	32.81	23.12	58.68
1975	114.4	51.9	67.05	43.26	109.79
1976	169.6	76.9	127.29	78.19	198.45
1977	223.4	101.3	203.81	118.64	301.10
1978	195.0	88.4	225.26	121.90	309.37
AVERAGE	57.3	26.0	29.85	21.68	55.03

Table 3.--Recent trends in annual mahimahi transactions, United Fishing Agency, Ltd., Honolulu, Hawaii.

	Year			
	1975	1979	1980	1981
Total number	3,918	7,814	8,687	10,957
Total weight (pounds)	75,965	112,832	142,158	173,135
Average weight per fish	19.39	14.44	16.37	15.81
Total value	$139,101	$242,407	$341,653	$440,749
Average price (current value)	$1.83	$2.15	$2.41	$2.55

Table 4.--Recent trends in annual ono (wahoo) transaction, United Fishing Agency, Ltd., Honolulu, Hawaii.

	Year			
	1975	1979	1980	1981
Total number	599	1,903	3,429	4,318
Total weight (pounds)	19,023	50,792	85,749	102,139
Average weight per fish	31.76	26.70	25.01	23.65
Total value	$12,782	$104,598	$183,891	$251,097
Average price	$0.67	$2.06	$2.15	$2.46

Table 3.--Recent trends in annual mahimahi transactions, United Fishing Agency, Ltd., Honolulu, Hawaii.

	Year			
	1975	1979	1980	1981
Total number	3,918	7,814	8,687	10,957
Total weight (pounds)	75,965	112,832	142,158	173,135
Average weight per fish	19.39	14.44	16.37	15.81
Total value	$139,101	$242,407	$341,653	$440,749
Average price (current value)	$1.83	$2.15	$2.41	$2.55

Table 4.--Recent trends in annual ono (wahoo) transaction, United Fishing Agency, Ltd., Honolulu, Hawaii.

	Year			
	1975	1979	1980	1981
Total number	599	1,903	3,429	4,318
Total weight (pounds)	19,023	50,792	85,749	102,139
Average weight per fish	31.76	26.70	25.01	23.65
Total value	$12,782	$104,598	$183,891	$251,097
Average price	$0.67	$2.06	$2.15	$2.46

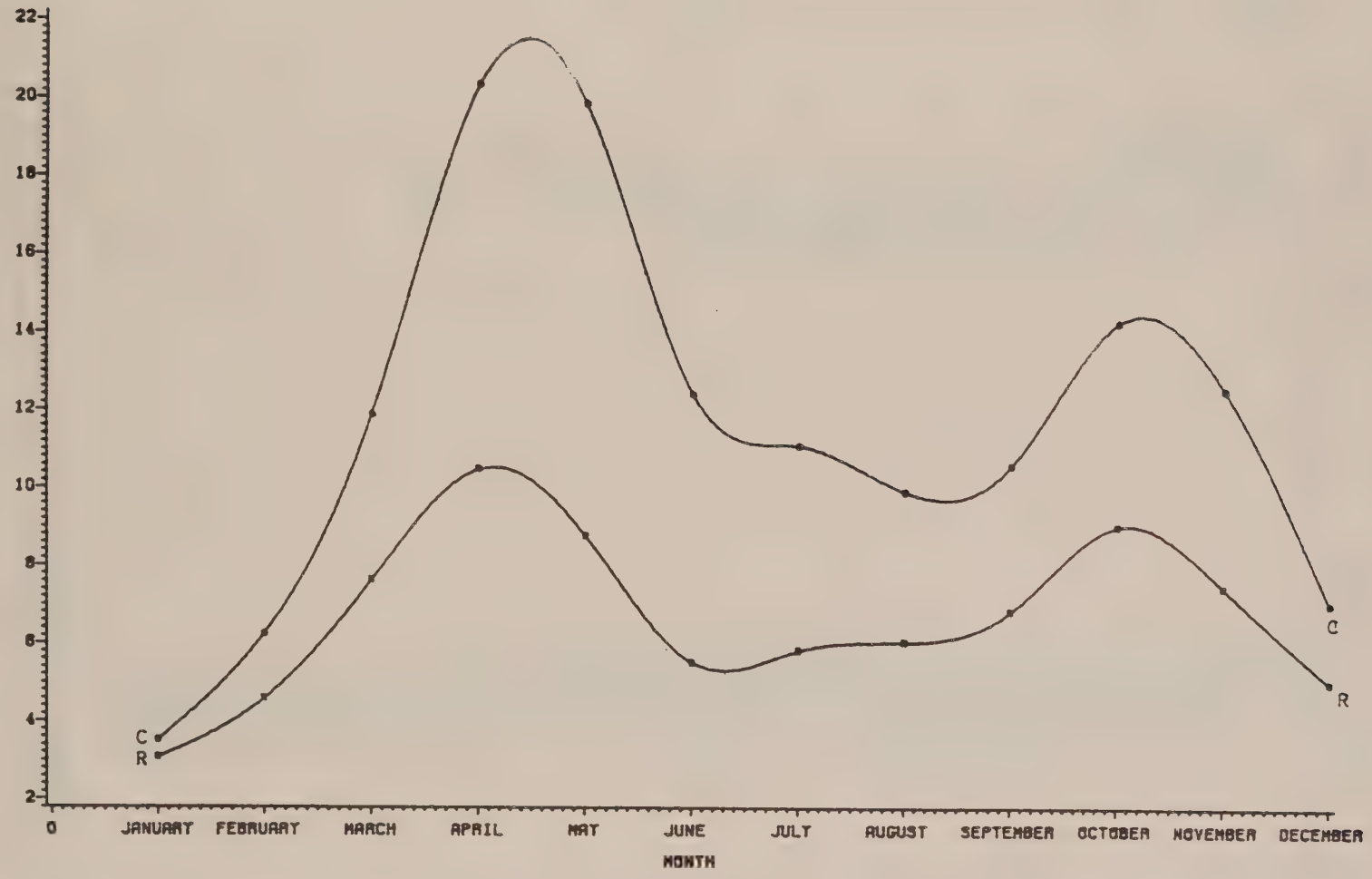


Figure 1.--Mahimahi monthly landings statewide. Catch (C) in thousands of pounds and revenue (R) in thousands of dollars. (Average 1949-78.)

Lag in months	Correlation between lagged and current month	Graph of correlation -1 .9 .8 .7 .6 .5 .4 .3 .2 .1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
0	1.00000	**********
1	0.48998	**********
2	0.39187	********
3	0.30905	******
4	0.43103	*********
5	0.23214	*****
6	0.05377	*
7	-0.00638	
8	-0.02552	*
9	0.00744	
10	-0.14069	***
11	-0.17474	***
12	-0.21156	****
13	-0.02472	
14	-0.20177	****
15	-0.20148	****
16	-0.24330	*****
17	-0.10680	**
18	-0.12125	**
19	-0.09874	**
20	-0.05061	*
21	-0.01693	
22	0.13976	***
23	0.15396	***
24	0.16506	***
25	0.19248	****
26	0.38956	********
27	0.33874	*******
28	0.23722	*****
29	0.19898	****
30	0.22547	*****
31	0.16548	***
32	0.02471	
33	-0.01117	
34	-0.05332	*
35	-0.04985	*
36	-0.17567	****
37	-0.15653	***
38	-0.15788	***
39	-0.04328	*
40	-0.14113	***
41	-0.15303	***
42	-0.15404	***

Figure 2.--Autogressive iterative moving average (ARIMA): Mahimahi landings (pounds): monthly 1976-80. The "." marks two standard errors. The "*" marks the correlation.

Lag in months	Correlation between lagged and current month	Graph of correlation -1 .9 .8 .7 .6 .5 .4 .3 .2 .1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
43	-0.07718	. ** .
44	-0.03105	. * .
45	-0.07715	. ** .
46	-0.02489	. .
47	0.02598	. * .
48	0.17892	. **** .
49	0.12314	. ** .
50	0.20923	. **** .
51	0.19686	. **** .
52	0.30858	. ******
53	0.20923	. **** .
54	0.21074	. **** .
55	0.10208	. ** .
56	0.09654	. ** .
57	0.08103	. ** .
58	0.00796	. .
59	-0.08855	. ** .
60	-0.11052	. ** .
61	-0.07840	. ** .
62	-0.20091	. **** .
63	-0.21737	. **** .
64	-0.26131	.***** .

Figure 2.--Continued.

Lag in months	Correlation between lagged and current month	Graph of correlation -1 .9 .8 .7 .6 .5 .4 .3 .2 .1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
0	1.00000	**********
1	0.46502	*********
2	0.36913	*******
3	0.32821	*******
4	0.47812	**********
5	0.28968	******
6	0.14241	***.
7	0.11975	** .
8	0.11167	** .
9	0.16035	***.
10	0.01344	.
11	0.01062	.
12	-0.02573	* .
13	0.17881	****
14	-0.02073	.
15	-0.01660	.
16	-0.05337	* .
17	0.07404	* .
18	0.04099	* .
19	0.03731	* .
20	0.05670	* .
21	0.08639	** .
22	0.21656	****
23	0.17447	***.
24	0.15823	***.
25	0.16238	***.
26	0.35778	*******
27	0.26857	*****
28	0.20097	****.
29	0.18041	****.
30	0.21125	****.
31	0.17749	****.
32	0.06482	* .
33	0.04433	* .
34	0.01618	.
35	0.02145	.
36	-0.10775	** .
37	-0.06672	* .
38	-0.09270	** .
39	0.03262	* .
40	-0.06797	* .
41	-0.05982	* .
42	-0.06950	* .

Figure 3.--Autogressive iterative moving average (ARIMA): Mahimahi revenue ($): monthly 1976-80. The "." marks the two standard errors. The "*" marks the correlation.

Lag in months	Correlation between lagged and current month	Graph of correlation -1 .9 .8 .7 .6 .5 .4 .3 .2 .1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
43	-0.00965	. .
44	0.02219	. .
45	-0.00827	. .
46	0.01626	. .
47	0.02903	. * .
48	0.16575	. *** .
49	0.09456	. ** .
50	0.15940	. *** .
51	0.13943	. *** .
52	0.23990	. *****
53	0.11598	. ** .
54	0.14421	. *** .
55	0.05763	. * .
56	0.03880	. * .
57	0.04491	. * .
58	-0.01409	. .
59	-0.07482	. * .
60	-0.10972	. ** .
61	-0.04909	. * .
62	-0.14834	. *** .
63	-0.12393	. ** .
64	-0.18073	.**** .

Figure 3.--Continued.

Lag in months	Correlation between lagged and current month	Graph of correlation -1 .9 .8 .7 .6 .5 .4 .3 .2 .1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
0	1.00000	**********
1	0.76659	**********
2	0.62083	**********
3	0.51347	**********
4	0.41215	**********
5	0.31869	**********
6	0.22165	**********
7	0.14201	**********
8	0.04682	**********
9	-0.01226	**********
10	-0.04813	**********
11	-0.10313	**********
12	-0.11433	**********
13	-0.14843	**********
14	-0.14304	**********
15	-0.11505	**********
16	-0.08788	**********
17	-0.07266	**********
18	-0.03673	**********
19	-0.01757	**********
20	0.02067	**********
21	0.06290	**********
22	0.12613	**********
23	0.12199	**********
24	0.13956	**********
25	0.15774	**********
26	0.17186	**********
27	0.17725	**********
28	0.19312	**********
29	0.18311	**********
30	0.18944	**********
31	0.13433	**********
32	0.06671	**********
33	0.02041	**********
34	0.03340	**********
35	0.02783	**********
36	0.01281	**********
37	-0.00518	**********
38	-0.03213	**********
39	-0.05783	**********
40	-0.06071	**********
41	-0.07204	**********
42	-0.04260	**********

Figure 4.-- Autogressive iterative moving average (ARIMA): Mahimahi prices ($): monthlly 1976-80. The "." marks two standard errors. The "*" marks the correlation.

Lag in months	Correlation between lagged and current month	Graph of correlation -1 .9 .8 .7 .6 .5 .4 .3 .2 .1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
43	-0.02181	. .
44	0.00149	. .
45	0.05169	. * .
46	0.09982	. ** .
47	0.13804	. *** .
48	0.15576	. *** .
49	0.17251	. *** .
50	0.20528	. **** .
51	0.22458	. **** .
52	0.27817	. ******
53	0.24020	. *****.
54	0.20668	. **** .
55	0.16967	. *** .
56	0.17726	. **** .
57	0.15326	. *** .
58	0.08565	. ** .
59	0.03034	. * .
60	-0.02679	. * .
61	-0.08103	. ** .
62	-0.10165	. ** .
63	-0.13104	. *** .
64	-0.12001	. ** .

Figure 4.--Continued.

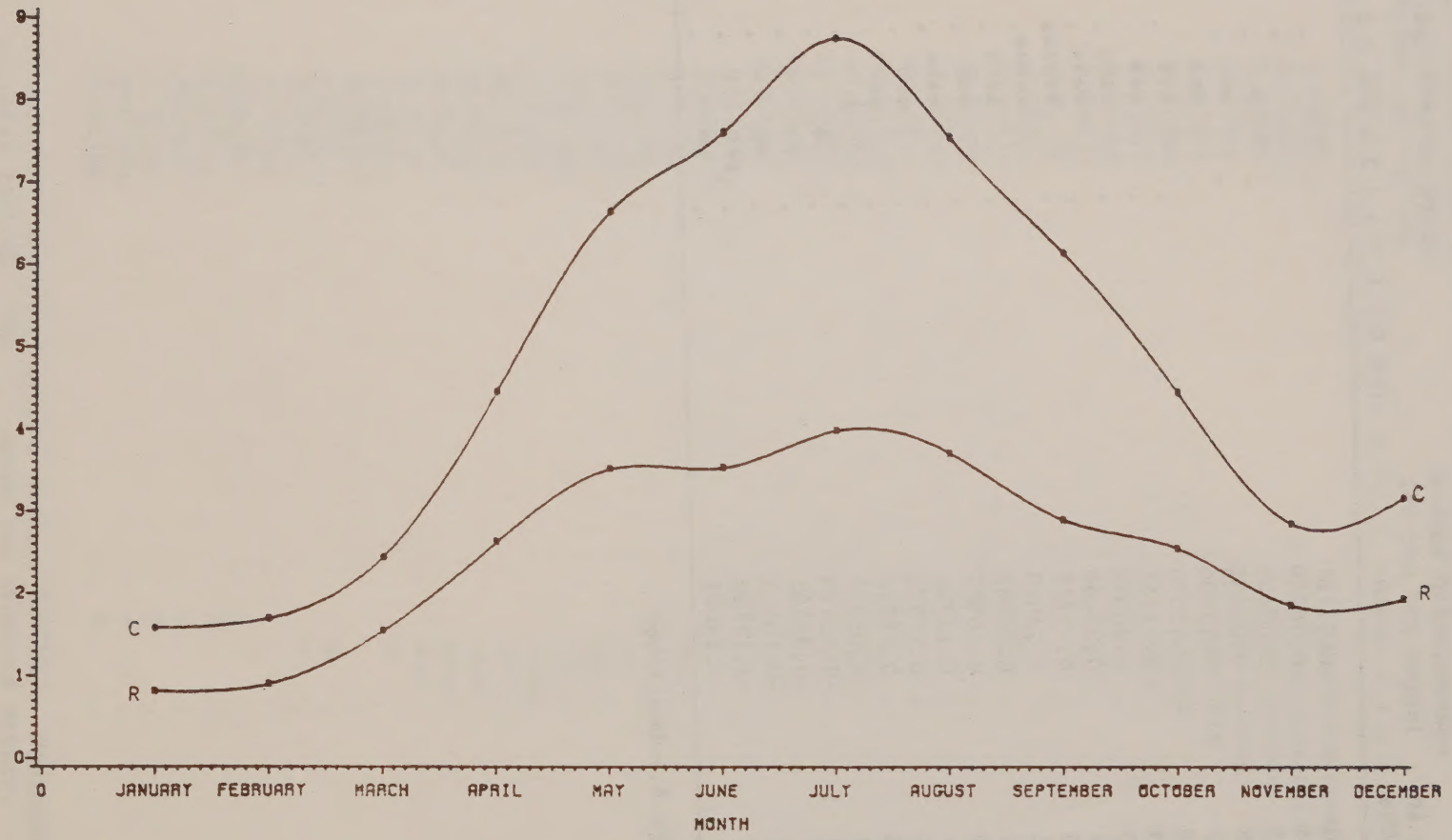


Figure 5.--Ono monthly landings statewide. Catch (C) in thousands of pounds and revenue (R) in thousands of dollars. (Average 1949-78.)